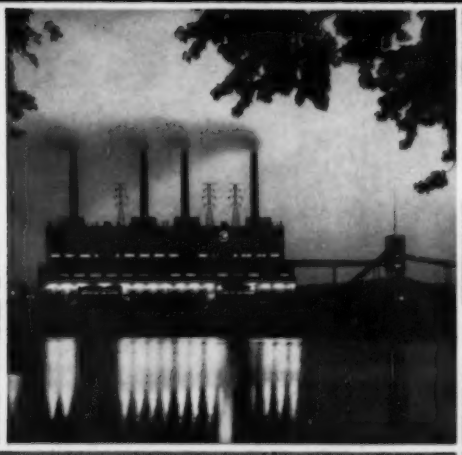
April 5, 1956

The IRON AGE

The National Metalworking Weekly



Ohio Valley: Boom Triggers New Markets P.59

How Steel Companies Rate Financially P.70

Speedy Shell Molding Saves Machining Time P.99

Digest of the Week P–2

Look at what's new
in faster yard service

New WHITING Heavy-Duty TRACKMOBILE®
Speeds Up Freight Car Switching, Spotting, Hauling!

The new Heavy-Duty Trackmobile lowers costs by keeping freight *on the move!* It easily pulls heavily loaded freight cars, expedites production, saves manhours. Exclusive design provides *both* road and rail utility . . . eliminates bottlenecks and clogged sidings. Ruggedly constructed, it provides continuous all-weather, day and night service with a minimum of maintenance.

The Heavy-Duty Trackmobile ends demurrage losses and wasted waiting time. It provides a *completely new efficiency* never before possible. It's powerful and dependable, does *big* jobs at *little* cost. Look to the Trackmobile for a new way to cut costs!

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15601 Lathrop Avenue, Harvey, Illinois

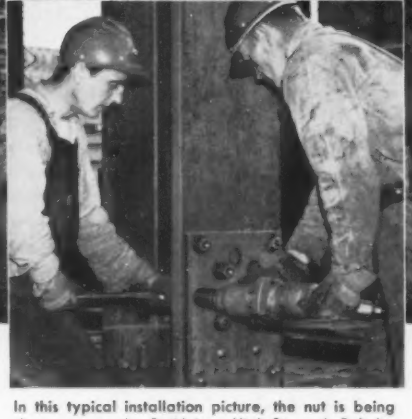
Manufacturers of CRANES • TRAMBEAM • FOUNDRY, RAILROAD AND CHEMICAL EQUIPMENT

The Trackmobile principle of operation has been proved in hundreds of applications in scores of industries.

Write today for the new Heavy-Duty Trackmobile Bulletin T-115. Indicate your particular car moving problems and we'll be glad to suggest ways the new Trackmobile will save you both time and money.

On rail wheels the Trackmobile pulls freight cars — moves to and from the track on road wheels. Use it to pull skids and carts when on road wheels.

General Contractor: Donald M. Drake Co.; *Architects:* Lawrence, Tucker and Wallman; *Structural Engineers:* Cooper and Rosé; Fabrication and erection, including high-strength bolting, by Bethlehem Pacific.



In this typical installation picture, the nut is being drawn up on the Bethlehem High-Strength Bolt by means of a pneumatic impact wrench, as a holding wrench grasps the bolt head firmly.

14-Story Medical Building Has High-Strength Bolting

This attractive new structure is the University of Oregon Medical School, in Portland. The 14-story building accommodates 277 patients and has extensive facilities for medical research. The steel members making up its 1170-ton frame were joined by Bethlehem High-Strength Bolts rather than by riveting.

Because of the saving in erection time they make possible, Bethlehem High-Strength Bolts are ideal for connecting structural steel members. They save time because they can be installed quickly by means of a calibrated pneumatic impact wrench. And not only does the wrench draw up the nut rapidly, it also applies sufficient torque to provide permanently tight joints.

Relative freedom from noise is another advantage of high-strength bolting, making it particularly desirable in areas where undue noise would be objectionable. For a pneumatic impact wrench is less noisy than a riveting gun.

Bethlehem High-Strength Bolts are made of strong carbon steel. They are heat-treated by quenching and tempering, and can be relied on to fully meet the requirements of ASTM Specification A-325.

If you would like to have more information about high-strength bolting, we suggest you call in one of our engineers. Just get in touch with the nearest Bethlehem office, or drop a line to us at Bethlehem, Pa.

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

DIGEST OF THE WEEK IN METALWORKING

April 5, 1956—Vol. 177, No. 14

The IRON AGE

Digest of the Week in Metalworking

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NEWS DEVELOPMENTS

ATOMIC ENERGY: GOVERNMENT GRIP SLIPS P. 62

There's mounting resistance among Congressmen, industrialists to AEC's attitude in parcelling out information on atomic energy. AEC appears to be relenting. During last few months, rules on exchanging atomic information have been eased. Here's the story on these latest changes in the regulations governing AEC-industry relations.

STOCKPILE: JUST OVER HALF FULL P. 63

Strategic and critical materials continue to mount in government stockpiles, but at slow pace. Total stockpile goal is $11.2 billion. Total value of goods now on hand has passed halfway mark—stands at $6.3 billion. Picture varies by category. ODM admits it plans to disperse some of its stored materials.

A REBUTTAL TO DEFENSE CYCLE ECONOMICS P. 64

This Midwestern economist contends Eliot Janeway over-simplifies in "Defense Cycle" theory as expounded in previous Iron Age issue. But he agrees that business cycle forecasting is out of date. His reasons vary from Mr. Janeway's, who is vigorously challenged in this rebuttal by Theodore Levitt.

1955 WAS GOOD YEAR FOR STEEL FIRMS P. 70

The steel industry established high marks last year in sales, production and profits. But problems lie ahead in the matter of prices and labor. Industry wound up the year with an operating rate of 93 pct.

SCOPE of Ohio River Valley boom is shown in views of atomic energy, steel and electric power activity. Photos on cover are: Left, Jones & Laughlin barge shipment; Center, Philip Sporn plant of American Gas and Electric Co. system; Right, line pipe of U. S. Steel's National Tube Div.; Bottom, officials check construction progress at AEC's Paducah plant. F. H. McGraw Co. photo. Story P. 59.

PACKARD AIMS FOR MIDDLE LUXURY MARKET P. 76

Executive is new Packard series to be introduced next week. Priced about $4200, it will compete with lower price Cadillac, Lincoln, Chrysler in middle luxury class. Late introduction of special model seen as possible trend for Independents to boost competitive position.

FEATURE ARTICLES

SPEEDY SHELL MOLDING SAVES MACHINING TIME P. 99

Shell molding a brand new steel provides an improved product at lower costs. In addition to design advantages, machining time is profitably cropped. Tool life is increased. Viewed from the shop standpoint, shell molding's meteoric growth isn't accidental. It's based on solid engineering.

WHAT DOES ARC CUTTING ALUMINUM COST? P. 103

They say arc cutting of aluminum costs less—but how much less? Here is the practical, production-floor experience of the first metalworking shop to use the new technique. In some operations, costs of cutting are down more than 95 pct. One job previously took five hours, now is handled in five minutes. Welders pick up the new technique fast. This firm's experience can aid your evaluation.

STEAM TREATMENT SOLVES TOUGH TOOLING PROBLEM P. 106

Milling a 0.250-in. keyway slot into 4140 cold-rolled steel barstock, heat treated to Rc 34 to 38, was no cinch. High speed cutters lasted 4 pieces only, couldn't be resharpened. Hard-chroming, carbide substitutes helped but little. Finally, furnace-treating in protective steam atmosphere upped life better than 1000 pct.

ARE HOLES IN STAMPINGS GIVING YOU TROUBLE? P. 108

Anyone can design a hole, so what's the problem? Simply a matter of doing it right the first time, of handling the job in a way calculated to provide long die life, to turn out holes that do their job properly. Considering costs, it's often not as easy as it sounds. These tips on handling hole problems can help you.

QUALITY CONTROL TRAVELS WITH PORTABLE TESTER P. 112

It's 21 lb of quality lab in a single package, ready to go where it's needed, when it's needed. This new electronic tester checks both ferrous and nonferrous metals with equal dependability. And versatile? It sorts metals, spots differences in hardness, heat treatment, metallurgical structure—even plating adhesion.

MARKETS AND PRICES

AIR CONDITIONING MEETS CHALLENGE P. 66

A competitive market situation resulted in over-production in 1954. The industry is still recovering despite sales gains each year. Both room units and central units count on major gains in next decade.

WEST IN LINE FOR MORE AUTO SPENDING P. 85

Automakers will spend half billion dollars for parts and supplies for California-assembled cars and trucks by 1958. Money will be spent on the Coast. But heretofore, million tons of parts have been brought out from East to meet demand. Industry is gearing to cash in on the opportunity.

ORDER DROP DOESN'T SURPRISE BUILDERS P. 87

The fact that February orders dropped below the $100 million mark for the first time in five months doesn't surprise or worry machine tool builders. Most consider it a healthy leveling off, at about $86 million. Shipments were up and backlog of orders is still about 8.5 months.

STEEL MARKET STRENGTH ON SOLID GROUND P. 155

Indications are beginning to appear that the steel market is based on more than fear of a steel strike. Some consumers are as anxious to get on third quarter books as on second quarter. Iron Age forecast is raised.

BRADEN COPPER PRICED ON WEEKLY BASIS P. 162

Kennecott Copper Co. has announced that its Chilean subsidiary, Braden Copper Co., will sell its copper in the U. S. at a price based on weekly average of London Metals Exchange.

NEXT WEEK:

TACONITE: A BIG JOB GETS BIG THINKING

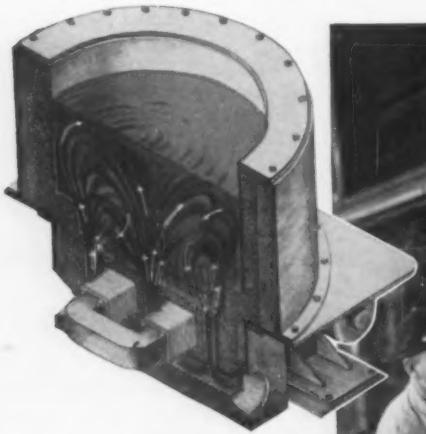
Getting taconite from the ground to blast furnaces is one of the toughest jobs ever to confront the steel industry. Jet piercer at right is one of many new tools developed to conquer natural stumbling blocks. Special article brings story into focus. Reserve Mining Photo.

Hard-To-Melt Bronzes Successfully Handled

In

Ajax Induction Furnaces

Brass and bronze foundries all over the country have found AJAX-TAMA-WYATT induction furnaces a reliable tool for melting silicon bronzes, aluminum bronzes, leaded bronzes, phosphor bronzes, and other high strength alloys. Operation is highly economical due to the good uniformity of the alloys, low ratio of rejects, drastic reduction of metal losses, and clean operating conditions. This recent development opens the field for the use of AJAX induction furnaces in all foundries where difficult-to-melt alloys are handled.



Cross section of AJAX-TAMA-WYATT twin coil induction furnace such as used at the Torrance Brass Foundry. Heat is produced within the molten metal in the secondary channels and conveyed throughout the melt by electromagnetic circulation, resulting in minimum metal losses and high uniformity of alloy. Temperature is automatically controlled.

Baseball Fans—Do you recognize this man? He is Rocky Bridges, Cincinnati Redleg infielder, keeping in condition during the winter season at Torrance Brass Foundry, Torrance, Cal.

(Photograph courtesy of Long Beach Press-Telegram, Long Beach, Cal.)

The furnace pictured here is melting aluminum bronze at the *Torrance Brass Foundry, Torrance, Cal.*, operating at a temperature of 2500 F, for the production of high strength centrifugal castings. This unit is rated 100 kw. Note also the clean, smokeless operation as shown in the unretouched photograph.

SEE US AT THE AFS FOUNDRY SHOW, ATLANTIC CITY, MAY 3-9, BOOTH 1420

AJAX

TAMA-WYATT

AJAX ENGINEERING CORP., TRENTON 7, N. J.

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
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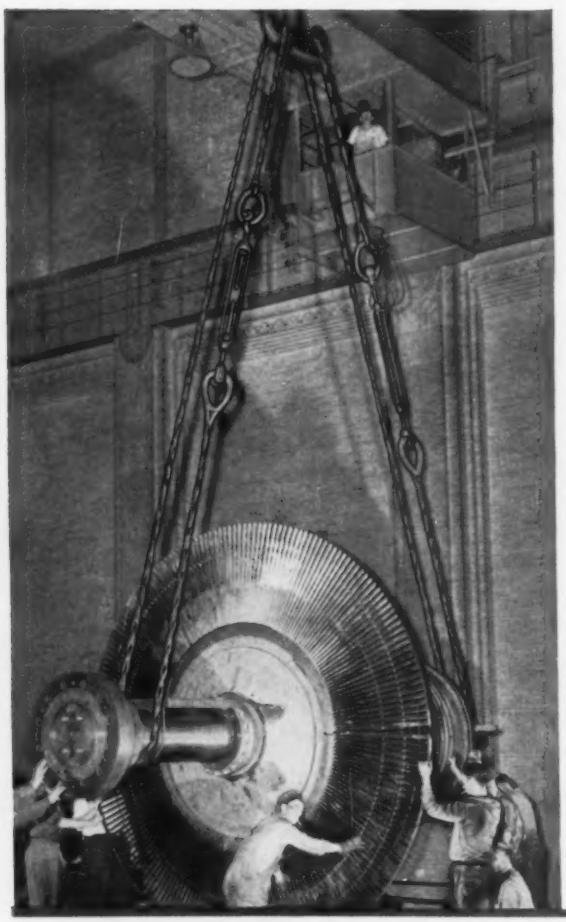
Two ATLAS Type 1, Round-Braided Slings handling 125-ton refinery vessel.

Two ATLAS Type 1, 8-part Round-Braided Slings handling 35-ton gear drive unit.

These specially balanced slings

make material handling safe, fast, and easy!



ATLAS slings are specially constructed to give you safe and easy handling of materials.

Because these slings are flexible and easy to handle, loads can be handled faster. This maximum flexibility permits the sling to hug the load with a safe, full-gripping contact. Because of the balanced ATLAS construction, each rope in the body carries an equal share of the load. These features give safe, fast, low cost handling.

If our wide variety of custom sling types and sizes doesn't include the sling you need, we will be glad to custom-design and custom-make slings for you.

Call your Macwhyte distributor for prices, literature, or catalog; or write direct to Macwhyte Company.

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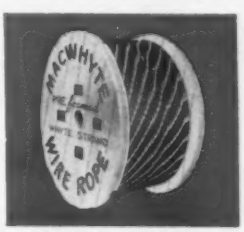
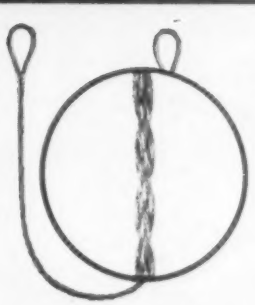


Distributors and mill depots throughout the United States.

← Two ATLAS Type 5, 8-part Round-Braided Slings with jaw and jaw turnbuckles precision handling a 50-ton turbine rotor.

Here's ATLAS balanced braided sling construction



1. One right lay and one left lay wire rope are each spliced endless.
2. These ropes are hand-braided to form a round sling body.
3. All ropes in the body react in the same manner when loaded and each rope carries an equal share of the load.
4. These features produce a lightweight, flexible, kink-resisting sling that hugs the load for safe and economical handling.

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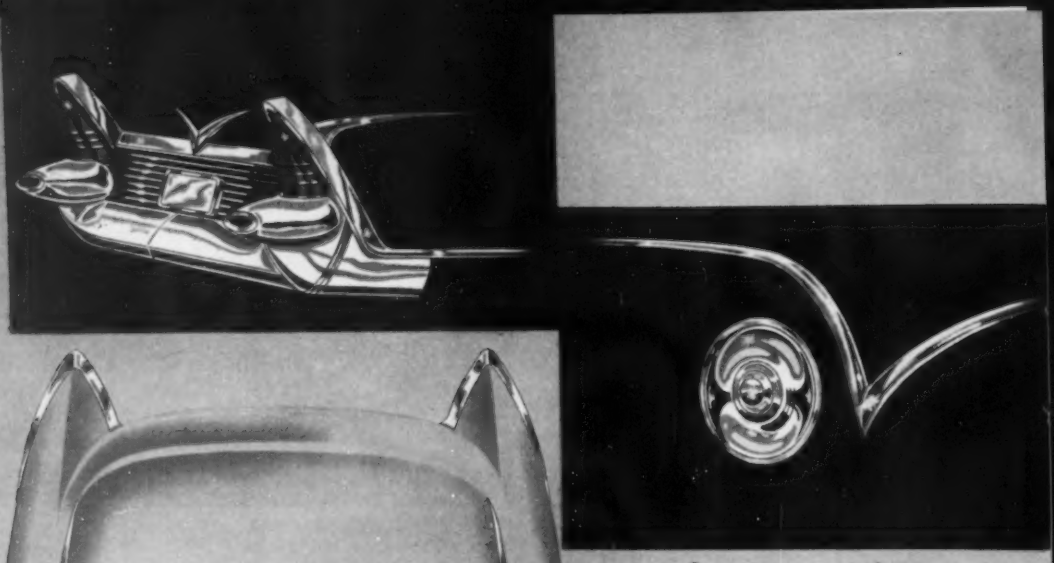
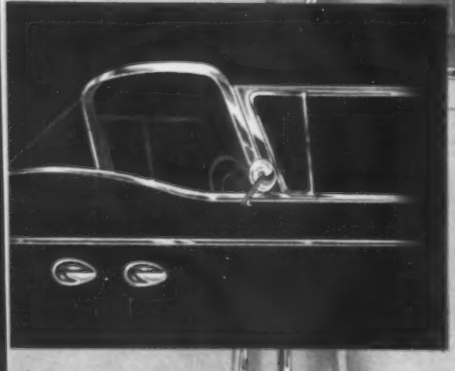
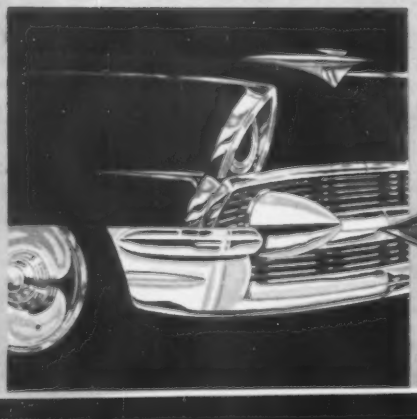


For modern living... the style is Stainless!





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Nothing looks so well so long as stainless steel, but, more important, modern living standards demand a metal that will resist denting, corrosion, road abrasion and pitting. Stainless is beauty all the way through. It's not a softy with a thin skin.

This maximum utility plus excellence of finish and consistent uniformity, coil after coil, have been big reasons why Sharon has remained a leading supplier of stainless steel to the automotive industry since the very beginning.

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BPA NBP

EDITORIAL

A Third Quarter Letdown?

◆ THERE ARE MANY people in the metalworking industry who are looking for a big letdown in the third quarter. This view is like spring fever—and comes about the same time of the year. It has its share of wishful thinking. Like "let's take a rest."

Because there might be a steel strike, everyone is ordering as much steel as he can get. That's what you hear. And it's true. All steel consumers are building up their stocks—if they can.

The story here is that steel users will get so much steel that if there isn't a strike there will be a letdown in steel operations and so on. Don't buy this story; it isn't true. If you let down your guard you will be sorry.

There are thousands of steel buyers who are clamoring for steel because they know the price will be higher—strike or no strike. They are right. It may be as much as $9 a ton higher—especially if the union hooks the steel companies for an 18 or 19¢ an hour package; including the expected unemployment plan.

The argument here runs: There are so many customers buying steel to beat the price rap that come the third quarter the pressure will be off. Don't believe it. It won't be.

You hear the same pitch about aluminum, copper, machine tools, motors, electrical machinery, lumber, cement, manpower and so on. The theme song is that for some reason things will have to fall off sharply in the third quarter because everyone bought his third quarter needs in the second quarter.

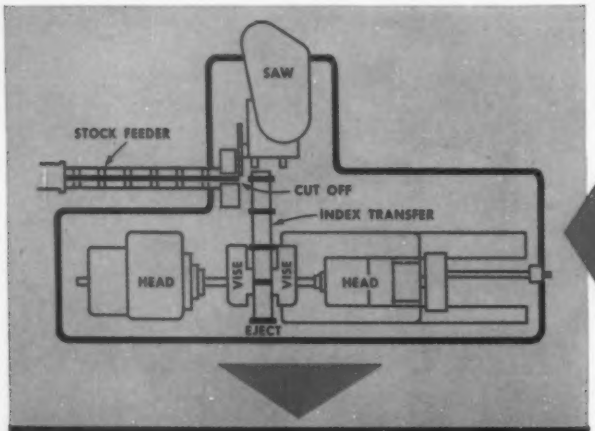
It isn't going to work out that way. Demand for steel and other metals; for metalworking machinery and tools is going up now. It is going to keep going that way for many a month to come.

Physical output of materials and products will be off this summer. But not for the reasons most people look for. There will be more mass vacations this year. There must be extensive maintenance and repair work done.

The third quarter will not be a droopy period. It will be held in check only by specific restrictions of vacations and long overdue plant shutdowns for "tightening up the baling wire." This delayed action will set off the fourth quarter boom!

Tom Campbell

EDITOR-IN-CHIEF

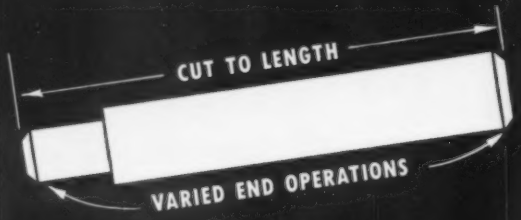


HOT BED OF ACTIVITY

Motch & Merryweather's new transfer machine widens the horizon for the simultaneous double-end machining of bar stock or tubing. Combined with cut-off to accurate length are: centering, chamfering, turning, drilling, or boring. Box mill turning is performed along with center drilling and chamfering. From stock pile to discharge, all operations can be fully automated. For the quickest answer to speed your stock processing, send us your part drawing.

Simultaneous

STOCK CUT OFF and DOUBLE END MACHINING

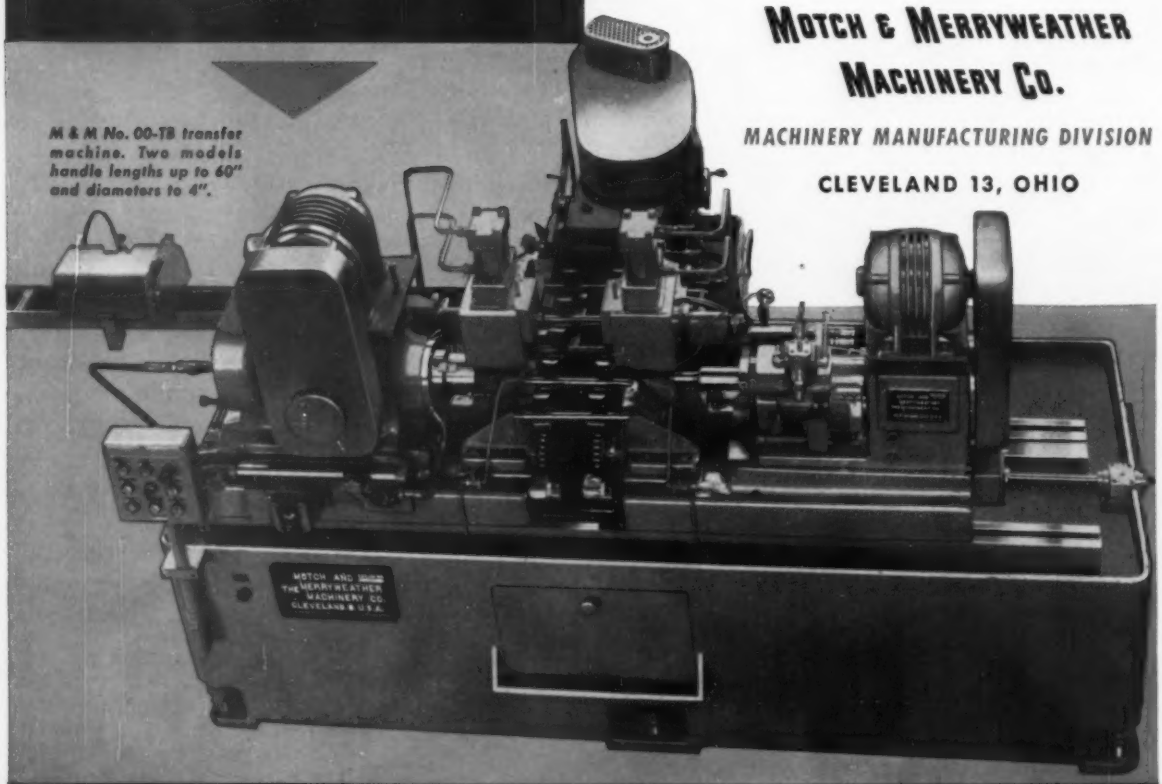


THE MOTCH & MERRYWEATHER MACHINERY CO.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

M & M No. 00-TB transfer machine. Two models handle lengths up to 60" and diameters to 4".



BUILDERS OF AUTOMATIC PRECISION CUT-OFF, MILLING, AND SPECIAL MACHINERY

dear editor:

letters from readers

Auto Cuts

Sir:

May I offer my compliments on your editorial "How Prophetic Are Auto Cuts" from the February 16 issue.

It has been well established that the greatest threat to the American Economy is fear itself and I believe that your editorial was particularly effective in combating economic fears at the time of your writing. The ideas in your editorial were logical, well developed, and carefully written. *W. Reynolds, Editor, Keynotes, Keystone Steel & Wire Co., Peoria, Ill.*

Installment Buying

Dear Sir:

Your editorial in the March 15th issue, "Do We Need Credit Controls?", caused me to reminisce a bit about what happened in 1929.

I remember an article, published in *Colliers* during 1930, written or dictated by Owen D. Young, who was then the president of General Electric.

In substance he said "Due to the installment plan of buying, the unconsumed goods of the nation are in the hands of the consumers who cannot liquidate; which differs from the situation in 1921, when the major portion of unconsumed goods was in the hands of the wholesalers and manufacturers, who were in a position to liquidate quicker and begin the rebuilding of a better economy; therefore this depression will be of much longer duration."

In pondering your question we must take into consideration that there does exist now some controls and safeguards that did not exist in 1929.

We all know that installment buying supplies the "Life Blood" for mass production, and it must not be seriously tampered with. However, I can't wholly agree that most people generally realize when they "have had it."

The growth and bustling business of our local finance companies leads me to believe that too many people not only are paying for new autos, furniture, appliances, etc., on the installment plan, but have also "hocked" the stuff that they had finished paying on.

Wants Easier Credit

Perhaps our most urgent need for sound economy is to make money credit easier for the working man. He is the man that needs it most, and yet he is paying the highest interest rates; akin to usury in my book.

I hope you are not a stockholder in some finance company, because if you are my opinions will offend you. If you are I would like to bust you in the nose. *H. D. Hiatt, Indianapolis, Indiana.*

The answer to the last question is no. —Ed.

Defense Cycle Theory

Sir:

May we have fifty reprints from IRON AGE, March 1, 1956, issue of Eliot Janeway's special report "Is 'Business Cycle' Old Hat?", which your New York office advises are available. *N. L. Deuble, Manager, Metallurgical Development Div., Climax Molybdenum Co., New York, N. Y.*

Sir:

We would like to order reprints of the article entitled "Is 'Business Cycle' Old Hat?" for distribution to our sales force. This article starts on page 30 of your March 1 issue. At this time, we would appreciate your sending us 5 tearsheets of this story. *H. W. Holdsworth, Advertising Manager, New Departure Div., General Motors Corp., Bristol, Conn.*

For Ideas Unlimited...

consider a ball

Like everyone else who lives by "ideas," you, too, may now and then find yourself face-to-face with a blank drawing pad, wondering where your *next* idea is coming from . . .

Next time you are, think of a ball . . .

A Universal Ball.

You're likely to find *so many new ideas* hidden inside *just one* microscopic-size Universal Ball (to say nothing of the bigger ones) you'll have an idea backlog that will *never* run dry.

Fifteen years ago, for instance, who ever thought we'd be using a *ball* as a writing instrument? Well any day, now (perhaps *every* day), someone may design a product that's just as revolutionary . . . A product just as profitable . . . A product built around a Universal Ball—a ball that is *better than* 10-millionths of an inch accurate!

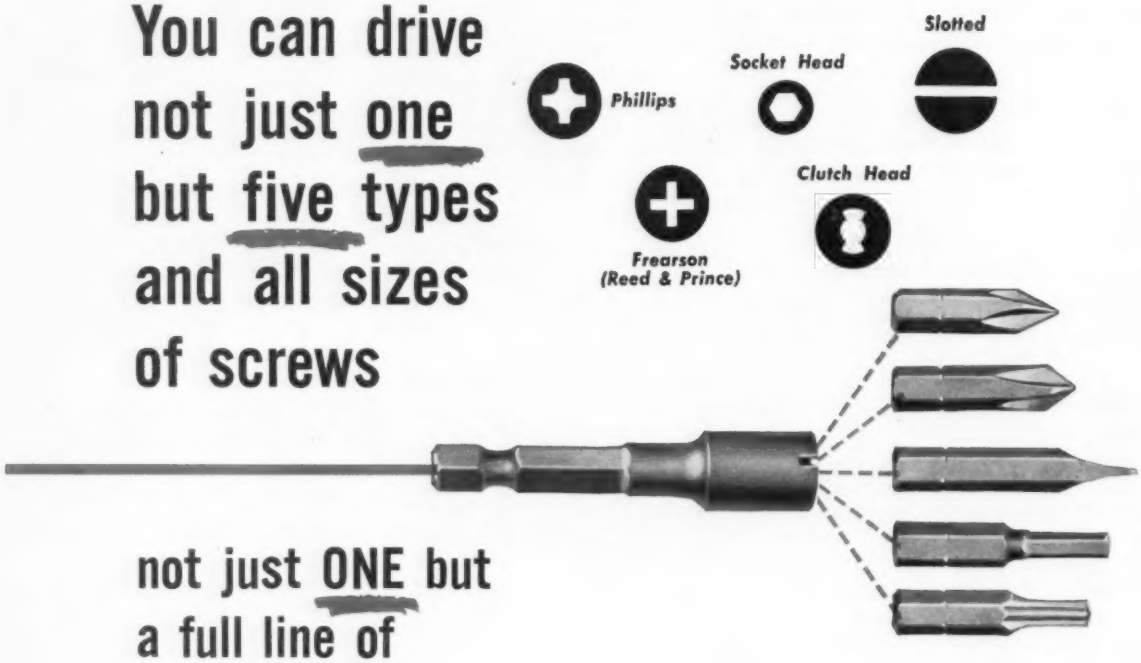
It *could* be *you*. And we'll be glad to help at the drop of a postcard.

Universal Ball co.

WILLOW GROVE
MONTGOMERY CO., PA.

Only APEX has all the tools for every fastener need..!

You can drive not just one but five types and all sizes of screws



not just ONE but a full line of screwdriving tools

Select the type, size and make of screws best fitted to your fastening requirements . . . choose the method of operation that meets your particular needs . . . then ask Apex for the screwdriving tools to help get the job done faster, better, more economically.

Apex—the authority on screwdriving—offers tools to fit all well-known makes of air, electric or spiral drivers . . . standard and magnetic bit holders . . . shanks and reversible sockets for use on hex head sheet metal screws . . . tools for manual or power tool use.

Write, on your company letterhead please, for Catalog 21 (Standard Screwdriving Tools); Catalog 25 (Magnetic Screwdriving and Nut Running Tools); Catalog 29-R (Standard Nut Running Tools).

BIT HOLDERS and INSERT BITS

Originated and pioneered by Apex. Holders have exclusive, patented retaining lock ring to prevent bit from pulling out during driving operation.

plus

POWER BITS, COMBINATION HAND DRIVERS, HAND BRACE BIT HOLDERS, FEMALE SQUARE DRIVE BIT HOLDERS . . . HAND DRIVERS, HAND BRACE BITS, FEMALE SQUARE DRIVE BITS (Phillips, Frearson, Clutch Head) . . . OFFSET DRIVERS (Phillips, Frearson) . . . FINDER SLEEVE ASSEMBLIES (Slotted).

Ask APEX *for the answer to your fastening problem!*

THE APEX MACHINE & TOOL COMPANY

1029 S. Patterson Blvd. • Dayton 2, Ohio

fatigue cracks

by William M. Coffey

Itemia

We have a couple of little items today, one about IRON AGE and one about modern art. We'll throw these in and get on with the puzzlers. If you wish to skip the couple of items and move right on to the puzzlers, go right ahead. You can't make us mad because the money has been coming in pretty good lately.

* * *

Mr. I. H. Stauffer of New Orleans very thoughtfully sent us a newspaper clipping from New Orleans from which we quote in part . . .

. . . time did a backward flip yesterday afternoon when a capsule placed in the hollow of the Grand Army of the Republic monument in Chalmette cemetery May 25, 1880 was opened.

Louisiana Historical Society officials, reporters, photographers, police and a few curious bystanders held their breath. Major General Raymond H. Fleming adjutant general of the state, applied hammer and chisel and the lid gave way.

Excitement was at fervor pitch. The tension was frightening. Women fainted. Respectfully, Gen. Fleming removed the contents . . . and out popped THE IRON AGE, April 9, 1874.

* * *

This comes from a Currier & Ives, Chicago, clipping . . .

A modern artist whose masterpiece "Goulash in the Sky" won first prize in a recent art contest had his home robbed. Before ransacking the place, the burglars tied him up and he got a good look at them.

Later on he decided to aid the police by painting a picture of the thieves as he remembered them.

Armed with this painting, the police rounded up five midgets, a steam shovel, two mules without heads and a busted guitar.

* * *

Puzzlers

We think Caleb Flerk had 24 chickens (Mar. 8 puzzler) . . .

We think the square root of a googolplex is:

$$10^{10^{50}}$$

. . . and we think the three cube roots of unity are:

$$-\tfrac{1}{2} + \frac{\sqrt{-3}}{2}$$

$$-\tfrac{1}{2} - \frac{\sqrt{-3}}{2}$$

. . . and we think the winners are (an answer to any one of the above puts you on the honor roll): John J. Sciarra, Prewitt Aircraft Corp; R. V. Hutchinson; Sarie and the General Steel Castings Iron Age Puzzle Club; John Homer, Norman Chase, Dave Gromman of the Collins Radio Co. Iron Age Puzzle Club; Bob Castle, Hoover Co.; Abe Raich, CF&I Corp; D. M. Ertner, Western Electric; Jim Mull (and we're sure happy Mary Ann has come to her senses), The North American Manufacturing Co.; and Addison McGarritz, Jr., Armstrong Cork Co.

New Puzzler

Here's a challenging puzzler that comes from Fred V. Gienanth and Heiko Pacyna, Foundry Engineers of the Eisenwerke Muelheim/Meiderich A. G., Muelheim/Ruhr, Germany. Many thanks, Gentlemen. We'll see what happens.

Did you know there is a cube having an edge's length "a" where one can mill a square shaped boring out of it in such a manner that one can move another cube being bigger than the first one through it. In this case you will lose two of the cube's eight corners but the cube as a body keeps existing.

What is the biggest possible edge's length of this latter cube?

it's SEYMOUR NICKEL SILVER of course!

Take a close look at one of the "scoops" — or hooks — in the slide fasteners which play a key role in your daily living.

The *best* slide fastener scoops are made of Seymour Nickel Silver flat wire. They are formed on high speed machines that produce up to 300,000,000 of these tiny parts every day. Yet, so precise is the operation that tolerances are held to half-thousandths of an inch!

Because its uniform composition and temper enable it to undergo precise forming on high speed machines, Seymour Nickel Silver meets these requirements perfectly. It will not discolor materials — it is long wearing and corrosion resistant — it has the necessary eye appeal. Best of all, it has the *natural lubricity* which makes fasteners work smoothly and without sticking. These enviable qualities have helped make Seymour the leading supplier of nickel silver wire for the slide fastener industry.

Beyond that, Seymour's readiness to produce nickel silver alloys in strict conformity to users' needs has prompted many manufacturers to say . . . "SPECIFY SEYMOUR — You KNOW it's good!"

SEYMOUR

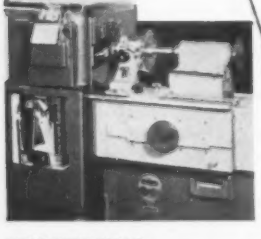
THE SEYMOUR MANUFACTURING CO.

2 Franklin Street, Seymour, Connecticut

Fellows Gear Inspection Instruments

Put your finger on all gear errors BEFORE costly rejects occur

FELLOWS RED LINERS . . . automatically record all gear errors in combination on a chart as the precision master gear rotates in intimate contact with the gear being checked. Three capacities to 18" p.d.



FELLOWS LEAD MEASURING INSTRUMENTS . . . are simple to set for checking various leads—also check crown and taper. Two capacities: 12" and 24" p.d. Chart errors at 500 to 1 magnification.

FELLOWS INVOLUTE MEASURING INSTRUMENTS . . . measure involute profiles—also location and amount of any involute modifications. Electronic recorders provide permanent chart records at 500 to 1 magnification. 12" and 24" capacity models.

Fellows Inspection Instruments are so simple to set up . . . so simple to use! Yet their accuracy assures positive quality control during production runs—finds and identifies gear errors before expensive hours of machine time and labor are wasted—prevents waste of costly material.

Whether you're making fine-pitch gears or large coarse-pitch ones . . . for your own use or for a customer . . . Fellows instruments give chart-recorded proof that specified gear limits have been met.

A Fellows Representative will be glad to show you how Fellows Gear Inspection Instruments can assure accurate and dependable control over the manufacture of high quality gears at the lowest possible cost.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2
5835 West North Avenue, Chicago 39
2206 Empire State Building, New York 1
6214 West Manchester Avenue, Los Angeles 45

THE PRECISION LINE **Fellows** *Gear Production Equipment*

dates to remember

APRIL

SCIENTIFIC APPARATUS MAKERS ASSN.—38th annual meeting, April 8-12, Belleview-Biltmore, Belleair, Fla. Society headquarters, 20 N. Wacker Dr., Chicago.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS—Annual conference, April 9-11, Netherland Plaza Hotel, Cincinnati, O. Society headquarters, 29 W. 39th St., New York.

AMERICAN MANAGEMENT ASSN. — Silver anniversary & packaging exposition, April 9-12, Atlantic City, N. J. Society headquarters, 1515 Broadway, New York.

SOCIETY OF AUTOMOTIVE ENGINEERS, INC. — National aeronautic meeting, April 9-12, Hotel Statler, New York. Society headquarters, 29 W. 39th St., New York.

EXPOSITIONS

MATERIALS HANDLING SHOW, June 5-8, Cleveland.

ASSN. OF IRON & STEEL ENGINEERS, Sept. 25-28, Cleveland.

METAL SHOW—Oct. 8-12, Cleveland.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS — 1956 Machine design conference, April 10-11, Bancroft Hotel, Worcester, Mass. Society headquarters, 29 W. 39th St., New York.

METAL POWDER ASSN. — 12th annual meeting, April 10-12, Cleveland Hotel, Cleveland. Society headquarters, 420 Lexington Ave., New York.

NATIONAL ASSN. OF ARCHITECTURAL METAL MANUFACTURERS—Annual convention, April 12-17, Belleview-Biltmore Hotel, Belleair, Fla. Society headquarters, 7209 Cedar Ave., Washington, D. C.

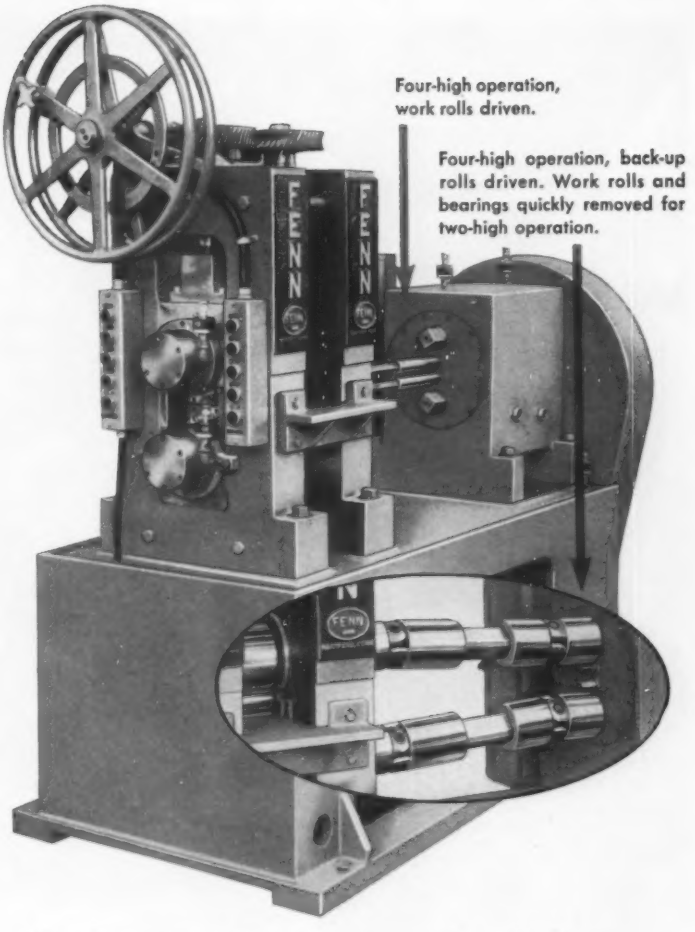
SHEET METAL CONTRACTORS ASSN.—Convention, April 16-17, Abraham Lincoln Hotel, Springfield, Ill. Society headquarters, 1928 Fullerton Ave., Chicago.

AMERICAN ZINC INSTITUTE—38th annual meeting, April 23-24, Hotel Statler, St. Louis, Mo. Society headquarters, 60 E. 42nd St., New York City.

MAY

NON-FERROUS FOUNDERS' SOCIETY—Annual meeting, May 3, Marlborough-Blenheim, Atlantic City, N. J. Society headquarters, 192 N. Clark St., Chicago.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS—1956 Pacific Northwest regional conference, May 3-5, Olympic Hotel, Seattle. Society headquarters, 29 W. 39th St., New York.


Four-high operation, work rolls driven.
Four-high operation, back-up rolls driven. Work rolls and bearings quickly removed for two-high operation.
FENN
FENN

Unique three-way drive gives unlimited flexibility

Fenn's new combination laboratory rolling mill may be operated as . . .

- Two-high
- Four-high, work rolls driven
- Four-high, back-up rolls driven

Efficient operation is assured over a complete range of reductions, extra-high bearing capacities permit substantial reduction of the newest, toughest materials.

Fenn engineering is at your service to roll samples of your material, to furnish practical and theoretical assistance as needed.

FENN

Precision Rolling Mills — Turks Heads — Wire Shaping Mills
Swaging Machines — Wire and Tube Drawing Machines

The Fenn Manufacturing Company, 301 Fenn Road, Newington, Connecticut

BEE'S IDEA of good housekeeping—frames for honeycomb boxes are neatly spaced with CF&I-Wickwire Tinned Finish Bee Wire.

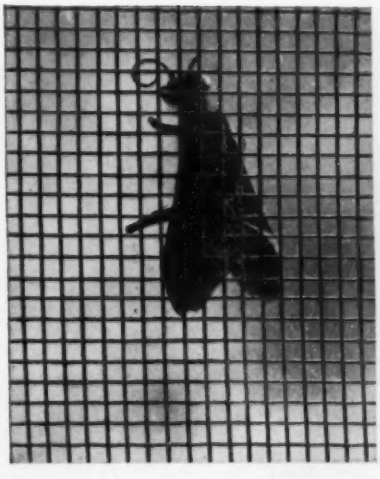
CF&I—WICKWIRE MAKES WIRE FOR THOUSANDS OF USES

VERTICAL TRAFFIC in buildings moves up and down safely and smoothly on elevator cables made of CF&I-Wickwire Rope Wire.

to support everything from a honeycomb to a freight elevator ... count on wire

An amazing number of widely varying needs for wire is encountered every day. The reason wire can be used so many different ways and for so many different purposes is because properties to suit almost any set of specifications can be built into the wire itself. Whatever your wire requirements—from rope wire of tremendous strength to easily-bent floral wire—your needs can be answered to your complete satisfaction. And CF&I-WICKWIRE, offering over a century of experience and complete wire-drawing and forming facilities, can provide exactly the wire you need.

You'll like doing business with CF&I-WICKWIRE and the particular attention given your own specific requirements. And you'll like the prompt service you get from CF&I-Wickwire Plants conveniently located from coast to coast. For detailed information, write our nearest district sales office.



"KEEP OUT" signs for insects. Screen cloth woven from CF&I-Wickwire Weaving Wire provides lasting protection against all kinds of flying insects.

HOLD UP. Flowers don't wilt or droop when CF&I-Wickwire Florist Wire is used in making floral designs and corsages.

WIRE SKELETON for new roads gives them greater strength and longer life. Here welded wire fabric is being laid down. Fabric is made of CF&I-Wickwire Industrial Quality Basic Wire.

JOINED FOR LIFE. Special CF&I-Wickwire Welding Wire is used for gas and electric welding.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver
El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo • Salt Lake City • Wichita
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

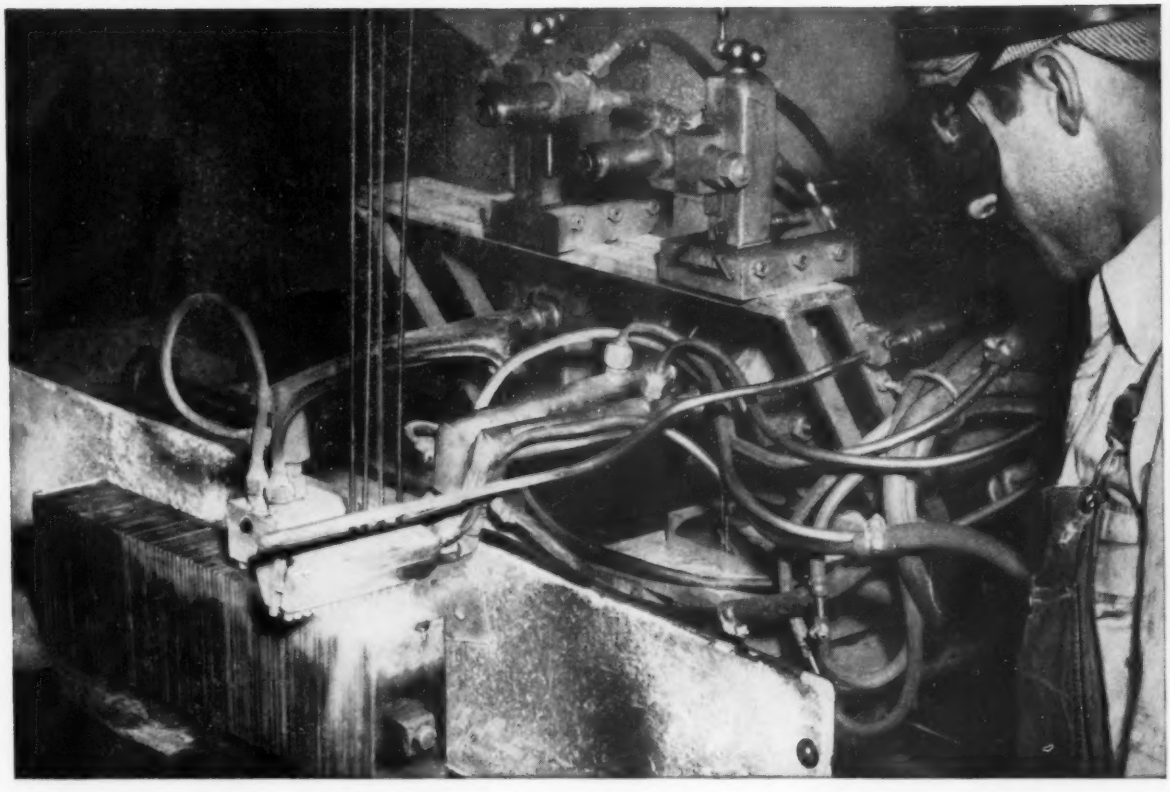
3146

If you haven't read this important booklet, your production line may be operating at less than peak efficiency. Your operations may be beating competition with HSS today, but you will likely need carbide tooling to be the leader tomorrow.

Write for your free copy of this important booklet today!

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.



Hammer Life Increased Four Times by HARD-FACING

Hard-facing with HAYSTELLITE tube rod has increased the life of hammers used in a heavy duty grinder by four times. The hammers rotate at from 3000 to 3600 revolutions per minute while pulverizing metal turnings, limestone, glass, mica, and other severe abrasives. They are hard-faced mechanically on a model 800 straight-line machine. 70 hammers are processed at a time, and 1000 hammers are hard-faced in a normal working day.

HAYSTELLITE rod, the hard-facing material used on the hammers, forms an extremely hard surface that has good resistance to impact. It produces a deposit consisting of sharp, irregularly shaped particles of cast tungsten carbide evenly distributed in a matrix of tough steel. The tungsten carbide particles resist abrasion, and the steel matrix cushions the effects of sudden shock.

There are 15 HAYNES hard-facing alloys . . . a wide selection that guarantees you the right rod at the right price for every wear problem. The HAYNES Hard-Facing Manual describes these alloys in detail, and outlines recommended procedures for applying them. We shall be happy to send you a copy upon request.

We also design and produce mechanized hard-facing equipment. For a description of the process and available equipment ask for "Mechanized Hard-Facing" Form 8564.

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

A Division of Union Carbide and Carbon Corporation

UCC

General Offices and Works, Kokomo, Indiana

Sales Offices

Chicago • Cleveland • Detroit • Houston • Los Angeles • New York • San Francisco • Tulsa

"Haynes" and "Haystellite" are registered trade-marks of Union Carbide and Carbon Corporation.

It's not always possible to launder *all* the chips or filings out of ordinary wiping material. Chips come back to scar men and metal, to plague your production line. This man has already had four wiper cuts.

He had 4 wiper cuts last month

They're easy to distribute . . .

They really soak up oil . . .

Always a clean one handy . . .

Just toss 'em in the trash . . .

Chips can't hide in a clean Scott Wiper. Each Wiper is brand new, fresh from the carton. A man takes a Scott Wiper as he needs it . . . uses it for his face, his hands, his product.

. . . He had none!

The difference is . . . Scott Wipers

This is sanitary wiping. A man uses a Scott Wiper thoroughly, throws it away—takes a new one. No danger of cuts from hidden chips . . . no fear of skin infection from dirty wipers . . . when you take a fresh wiper from the carton.

And because Scott Wipers are disposable you save in many other ways. Sorting and baling are eliminated. Handling and distribution are simplified. Laundering becomes a thing of the past.

Put the Scott Wiper through its paces on your production line. Your local Scott representative or distributor is ready to demonstrate in your plant any time you say. Call him or mail this coupon right away.

SCOTT PAPER COMPANY
Dept. W-2, Chester, Pa.
Please send me more information about Scott "Throw Away" Wipers.

Name_____

Company_____

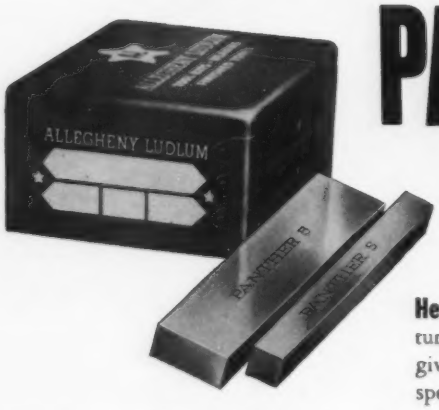
Position_____

Address_____

TRY and COMPARE

PANTHER 5 TOOL BITS

FOR YOURSELF



Here's what you GET in Panther 5 . . . A high-carbon, high-vanadium, tungsten-bearing high speed steel with 5% cobalt. Its analysis is designed to give this grade the highest red-hardness and abrasion-resistance of *any* high speed steel.

Here's how it can HELP you . . . This combination of highly valuable properties gives Panther 5 exceptional ability to resist wear, yet it also possesses good toughness and edge strength. Put Panther 5 Tool Bits on your heavy-duty jobs and abrasive materials—*watch them step up your production runs between grinds!*

Stocked in ALL SIZES . . . Panther 5 Tool Bits are produced as a finish-ground product. They're carried in stock for immediate shipment in nine sizes of squares, from ¼″ x 2½″ long to 1″ x 7″ long . . . and in eighteen sizes of flats, ranging from ⅜″ x ¼″ x 3″ long to 1½″ x ¾″ x 7″ long. ● *Why not get in a trial order—see for yourself what they'll do!* Check your nearest AL representative or distributor . . . or write ***Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.***

Valuable Data for
PRODUCTION MEN
. . . yours for the asking

1. **"HIGH SPEED TOOL BITS"**
Handy data on the complete AL line, comprising eight different grades of high speed steel tool bits. Includes shop handling, heat treat methods, etc.

2. **"CUTTING TOOL MATERIALS"**
This 36-page booklet analyzes and compares all AL grades of cutting tools: carbon and high speed steel, cast alloy and carbides. Includes data on handling and treatment.

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For complete **MODERN** Tooling, call

Allegheny Ludlum

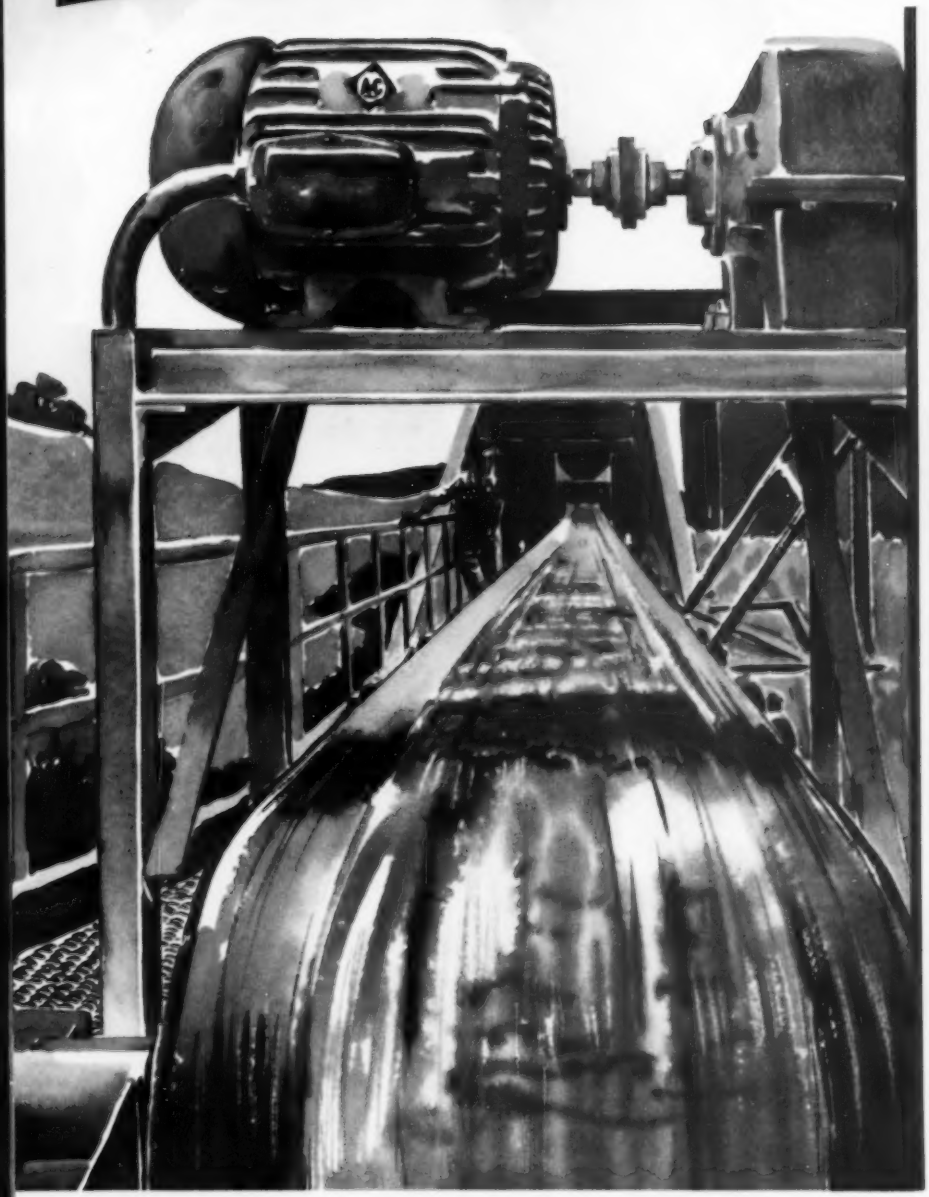
WSD-5564

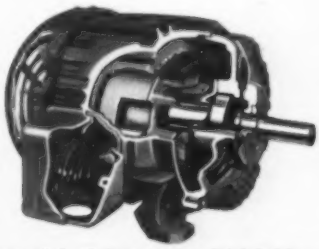
AL®
FINE TOOL STEELS
SINCE 1854

There's MORE

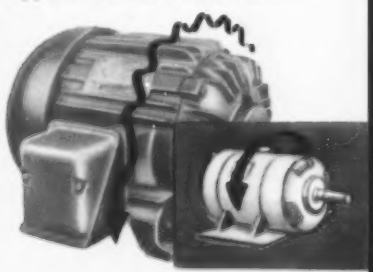
'Round-the-Calendar Operation

with Allis-Chalmers MOTORS





MORE IRON AND COPPER provide double protection against costly breakdowns. Liberal use of cast iron protects against frame distortion, and greater amount of copper increases electrical life.



MORE COOLING SURFACE of Allis-Chalmers deep-rib motors makes insulation burnouts highly improbable under normal conditions. There are no external enclosed air passages to become clogged.

A NATIONAL NETWORK of Allis-Chalmers Motor Distributors is on the job day and night... ready to provide the fast service needed to keep your plant operating 'round-the-calendar.

As a new machinery component or as replacement, specify Allis-Chalmers motors. To find out more, contact your nearby Allis-Chalmers district office, your A-C distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

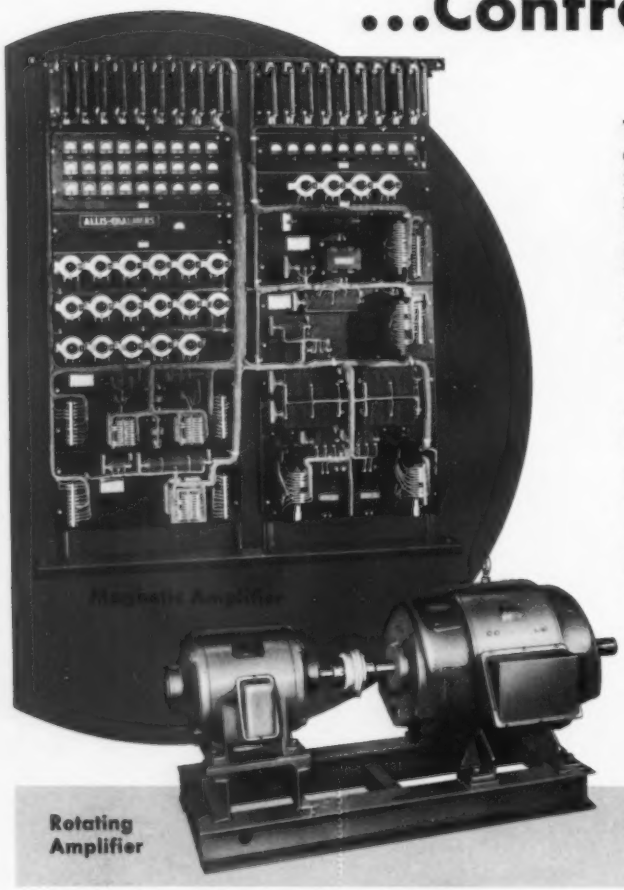
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-4906

You get **MORE** when you Specify Allis-Chalmers

...More Mill Production ...Control Over Quality



Rotating Amplifier

The most important factor in meeting the challenge of more tonnage and improved quality is effective regulation. And effective regulation is more than a matter of good regulator design. It embraces overall *system* design . . . the integration of generators, exciters, motors, regulators and other control equipment. As manufacturer of all these interdependent components, Allis-Chalmers is in a unique position to provide this practical approach to mill regulation.

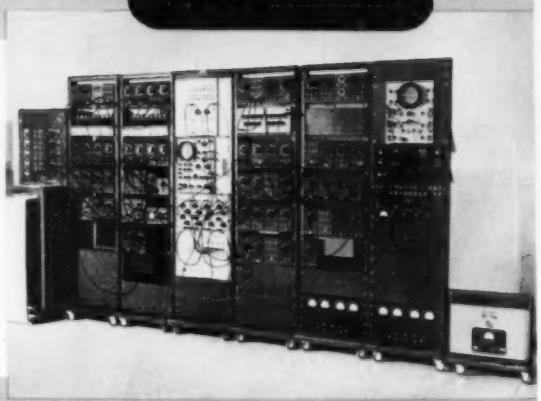
"Coordineered" System

Allis-Chalmers maintains separate departments, staffed by specialists, for each product. "Coordineering" results from an interdepartment exchange of ideas and technical information correlated in *one* department specializing in metals-producing industry application. All components are matched to meet the requirements of your job. Responsibility for system performance rests with one company.

For complete information, see your Allis-Chalmers representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

A-5029

ALLIS-CHALMERS
Regulators



Three Types of Regulators Available

The following types of regulation are "coordineered" into an Allis-Chalmers system:

1. **Regulex Rotating Amplifier** — Applicable where high power levels for reversible output are desired.

2. **Magnetic Amplifier** — Applicable where low power levels for reversing or high power levels for non-reversing are desired.

3. **Combinations of *Regulex* Rotating and Magnetic Amplifiers** — Each complements the other for maximum efficiency.

Analytical Facilities Utilized . . .

System performance is simulated in the computers to get optimum configuration of components. The constants and exciter ceilings necessary for desired response are established.

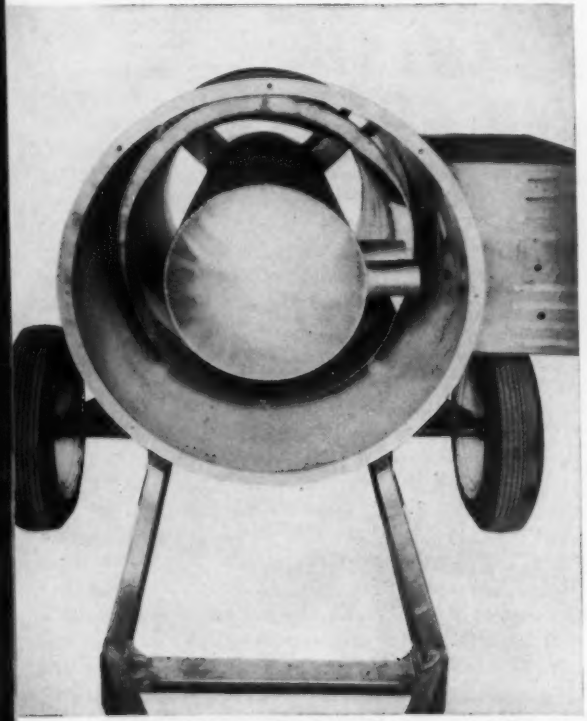
Regulex is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

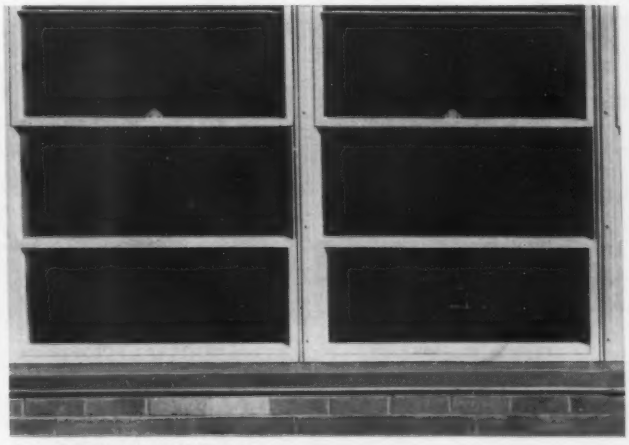
ALLIS-CHALMERS

FOR TRAILERS THAT DO NOT WEAR OUT. This Fruehauf trailer has sides made from thin sheets of Stainless Steel, corrugated into walls that are only one inch thick. That's why it can carry more cargo than trailers of other, heavier types of construction. Most joints are welded, an easy job with Stainless. There is nothing to corrode or loosen; in fact, no Stainless trailer has ever worn out!

NOTHING *can equal Stainless Steel*



FOR HEAT RESISTANCE. This is a Lennox Crop Dryer. It burns 12 gallons of fuel oil per hour and has an input of 2,000,000 BTU. Wherever the heat is most intense, type 430 Stainless Steel is used. It is especially important for the combustion chamber and emitting tubes.



FOR ARCHITECTURAL USE. This Dawson Floating Sill is made from type 302 Stainless Steel. It combines fine appearance with the enduring properties of Stainless Steel. The finished job is neat and trim, and it will last as long as the building.

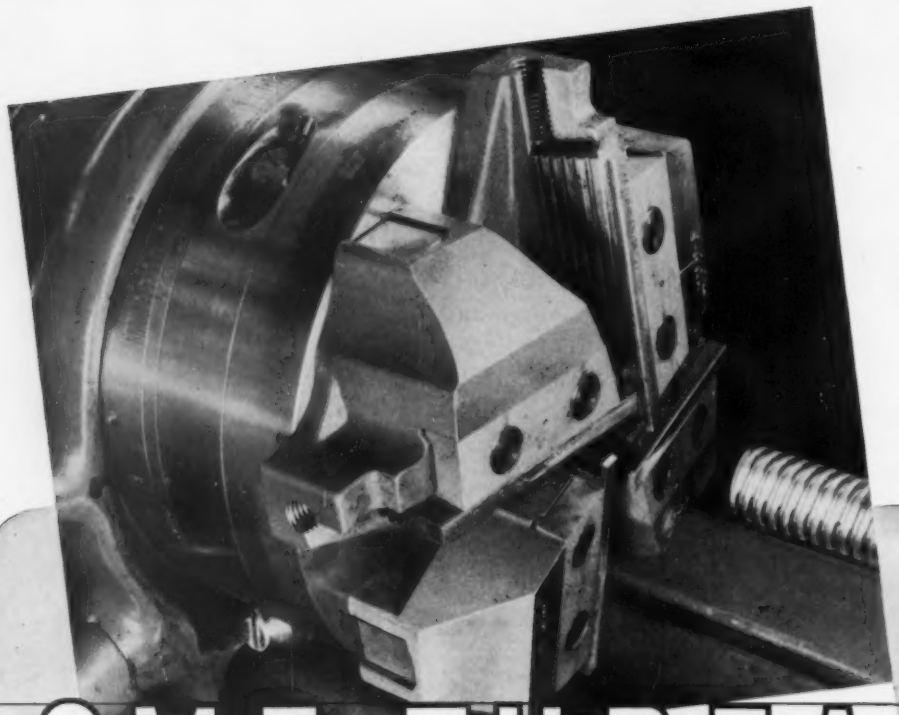
UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS STAINLESS STEEL

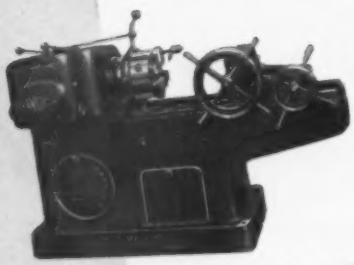
SHEETS • STRIP • PLATES • BARS • BILLETS
PIPE • TUBES • WIRE • SPECIAL SECTIONS

USS

UNITED STATES STEEL



ACME THREADS



BETTER FINISH AT LOWER COST

The Cooper Alloy Foundry Co. (Hillside, N. J.) has improved quality and reduced cost of their "certified" stainless steel valves by installing a LANDMACO Threading Machine for threading valve stems.

The 2½" LANDMACO Leadscrew Machine used is equipped with a 2½" R LANCO Head using roughing and finishing chasers with centering throats. Thread finish and concentricity is improved over previous methods, and threading time, set-up time, and tool cost reduced.

For example, ¼" pitch ½" lead Acme threads are cut on 1⅝" diameter 304, 316, and 347 stainless steel valve stems. Each valve stem is threaded with a full 1⅞" thread in 2.5 minutes floor-to-floor time—instead of 204 minutes by the previous method. The special chasers used eliminate the out-of-round condition common in long workpieces and produce coarse pitch threads of excellent finish in one pass.

This same LANDMACO Machine threads many other valve stems, requiring left-hand, right-hand, double-start and single-start threads, ranging from ⅜" to 1⅝" in diameter, with both Acme and UN thread forms. Tool cost is low—when producing a ¾" 6 pitch single Acme thread 5⅛" long, an average of 500 pieces is threaded between chaser grinds.

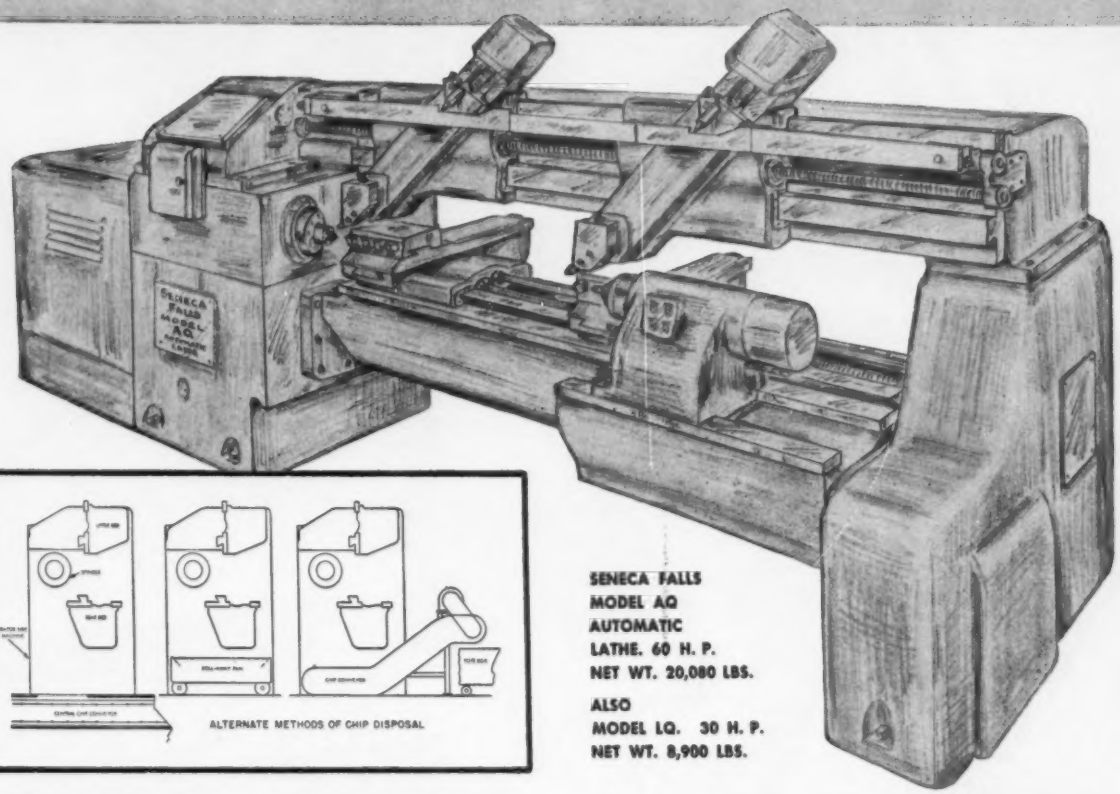
This case history illustrates the great possibilities of the LANDMACO Threading Machine—a better quality thread, lower thread cost, versatility of production. Can your plant profit from these benefits?

Write for Bulletin H-75

LANDIS *Machine* CO. WAYNESBORO PENNA., U.S.A.

873

A BETTER METHOD OF MACHINING REAR AXLE, AND OTHER SHAFTS



ALTERNATE METHODS OF CHIP DISPOSAL

SENECA FALLS
MODEL AQ
AUTOMATIC
LATHE. 60 H. P.
NET WT. 20,080 LBS.

ALSO
MODEL LQ. 30 H. P.
NET WT. 8,900 LBS.

● The new Models LQ and AQ Seneca Falls Automatic Lathes are designed to combine the best and fastest methods of rough and finish turning shafts on a single machine without removing the work and without attention on the operator's part.

The roughing operation is accomplished with multiple tools on a rear carriage while finish turning is done with single, tracer-controlled tools on each of the two overarm carriages. Thus the advantages of multiple tooling for stock removal and single tool tracer turning for accurate finish operations are combined. By this method extremely close tolerances are maintained since the pressure of the single tool is constant over the entire length of the work piece, and full advantage can be taken of the higher cutting speeds now possible with the newer carbide and oxide tool materials.

The machining operation is completely automatic . . . the operator loads shafts between centers and pushes the starting button; multiple tools rough turn; tracer tools then finish turn; and finally the machine stops with all tools returned to starting position.

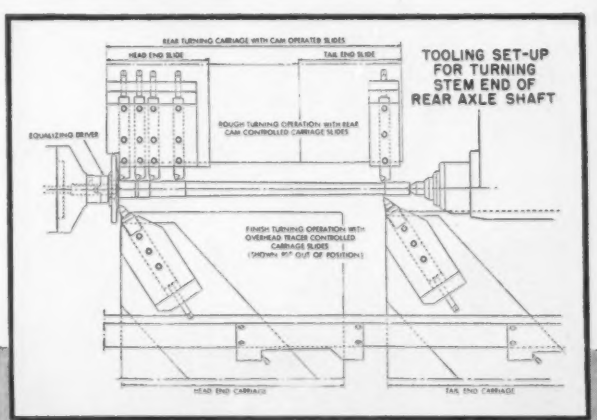
A similar type lathe is used for the flange turning operation. Varying application of multiple tooling or single tracers to either rear or overarm carriages is possible on these lathes and complete "in line" automation can be engineered to specific production requirements,

SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

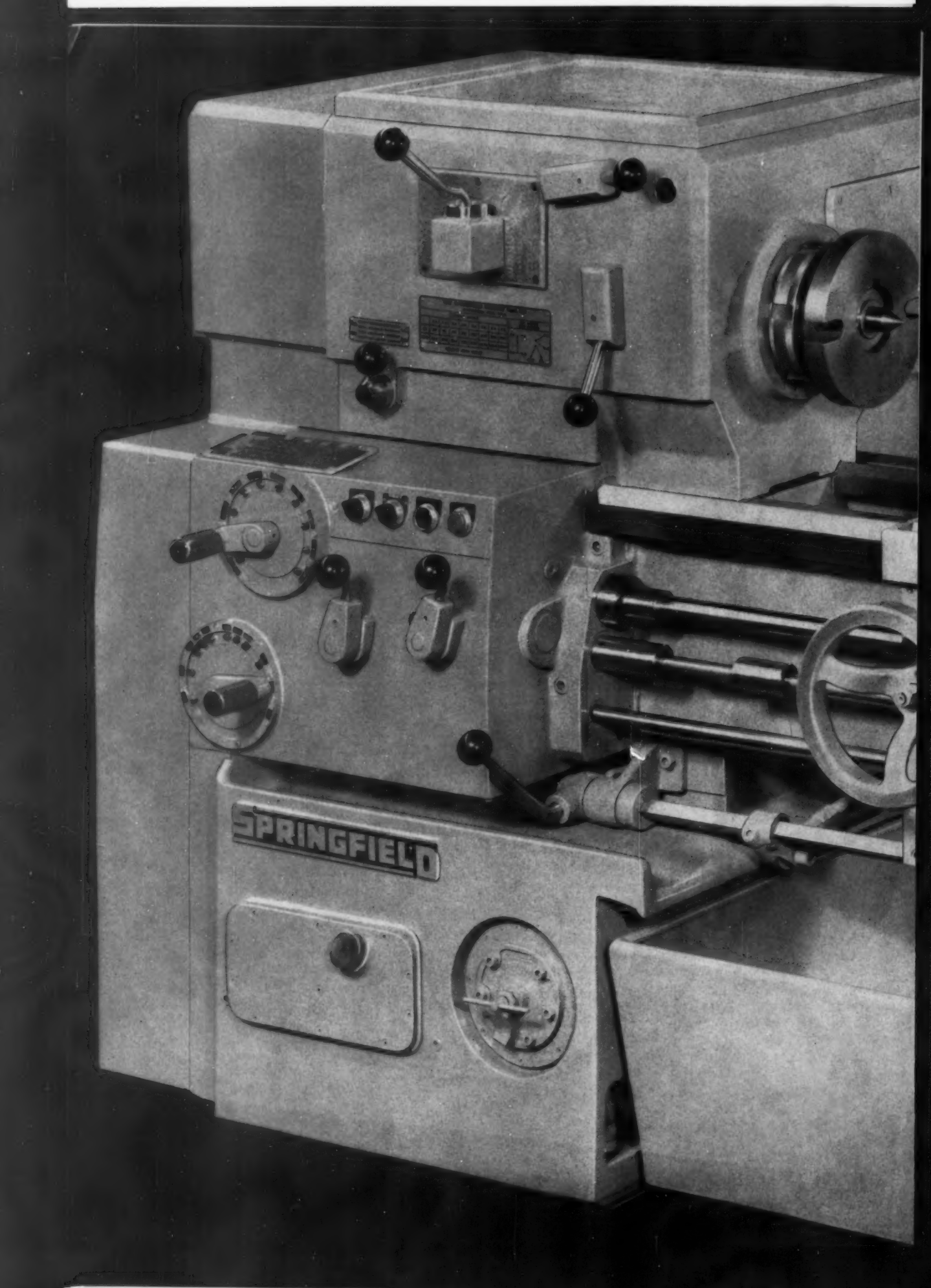
WRITE FOR BULLETIN AX 56F

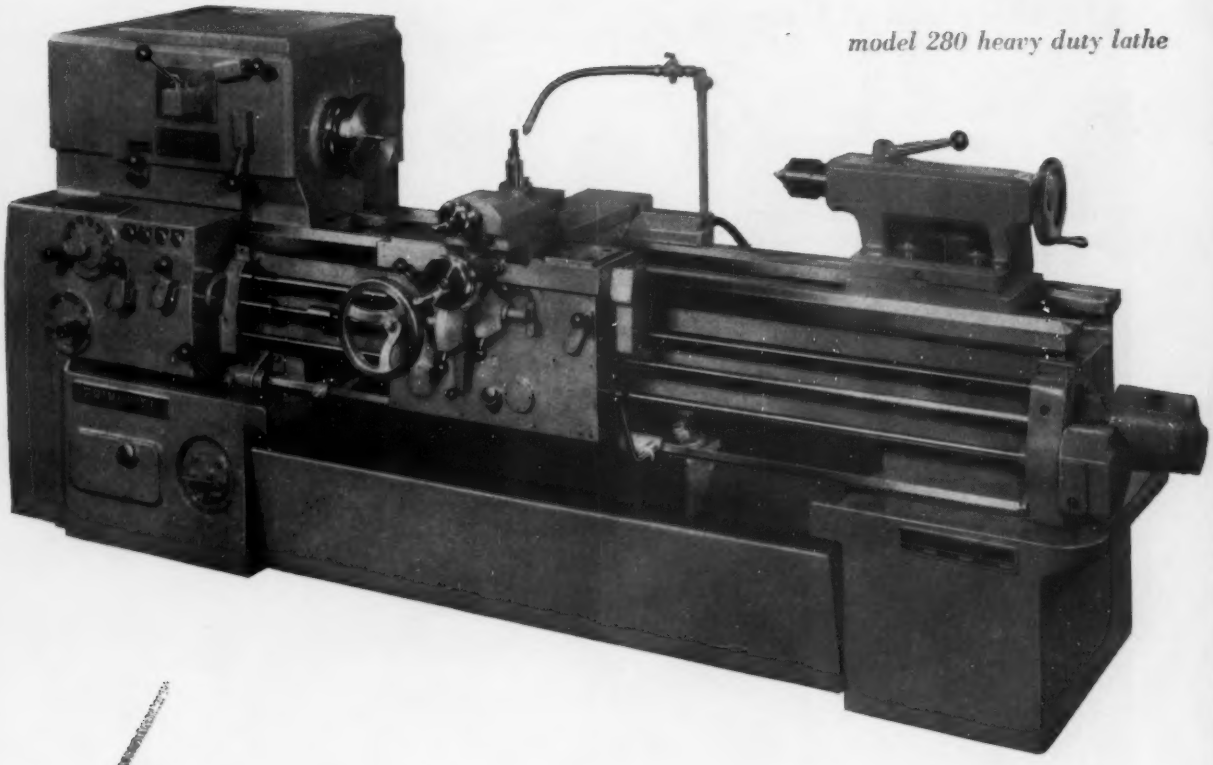
DESIGN FEATURES

- **Simplified changeover features for reduced set-up time.**
- **Feed rate may be automatically changed during cutting cycle.**
- **Streamline design for efficient chip guarding.**
- **Screw feed to all carriages.**
- **Four speed head with automatic change-over.**
- **Large chip flow area.**
- **All templates clear of chip area.**
- **All ways hardened, ground and replaceable.**
- **Open front design facilitates loading and unloading.**
- **Straight line diameter adjustment for tracer tools . . . no shoulder length change to correct.**


REAR TURNING CARRIAGE WITH CAM OPERATED SLIDES
HEAD END SLIDE
TAIL END SLIDE
TOOLING SET-UP FOR TURNING STEM END OF REAR AXLE SHAFT
EQUALIZING BEAM
ROUGH TURNING OPERATION WITH REAR CAM CONTROLLED CARRIAGE SLIDES
FINISH TURNING OPERATION WITH OVERHEAD TRACER CONTROLLED CARRIAGE SLIDES
(SHOWN 90° OUT OF POSITION)
HEAD END CARRIAGE
TAIL END CARRIAGE

NEW SENECA FALLS
MODEL LQ AND AQ AUTOMATIC LATHES


SPRINGFIELD



model 280 heavy duty lathe

it does more work for less money

Springfield is proud to present a new heavy-duty 16″ engine lathe, the Model 280. It offers high horsepower—10, 15 or 20 hp—for heavy cuts, clean design, and ease of operation, all at a reasonable price. Direct simplicity and straightforward design assure low maintenance cost.

It has no electronic brain, because Springfield believes that most of today's jobs still require craftsmanship of the human variety. In the Model 280 the price is for the tool, not the brain.

Only the gears necessary for a given speed are in mesh. Sixteen speeds to choose from, 60 feeds and threads—available instantly to any operator. Unique sealed oil spray lubricates and cools gears. It's the lathe most easily converted to contouring and reproducing with accessories, without budget strain. If you're in the quality market for a new heavy-duty lathe that still respects the contribution of craftsmanship, the Model 280 is for you. Basic price FOB Springfield, Ohio, $8,013.

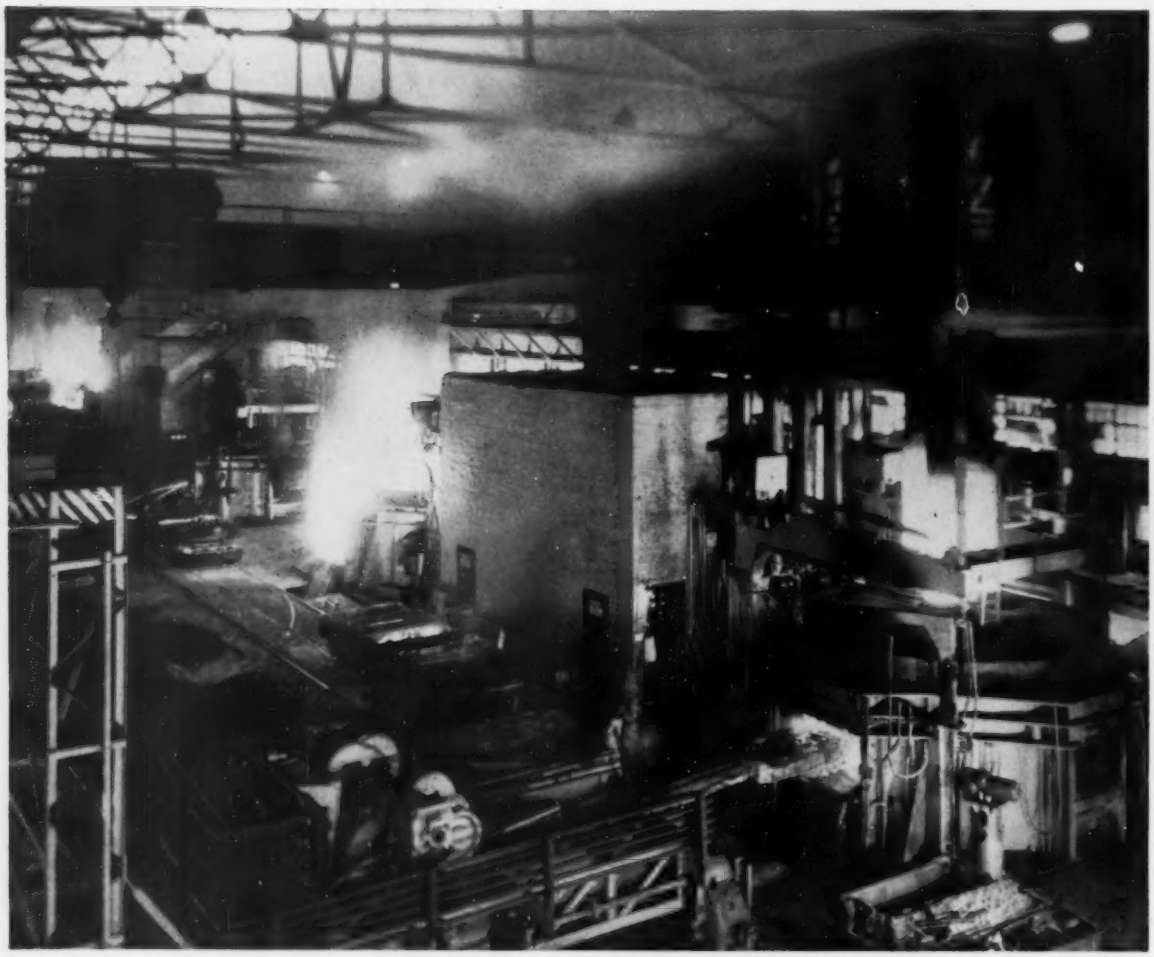
The Springfield Machine Tool Company
Springfield, Ohio

65TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS

SPRINGFIELD

(Advertisement)

Steelmaking Progress

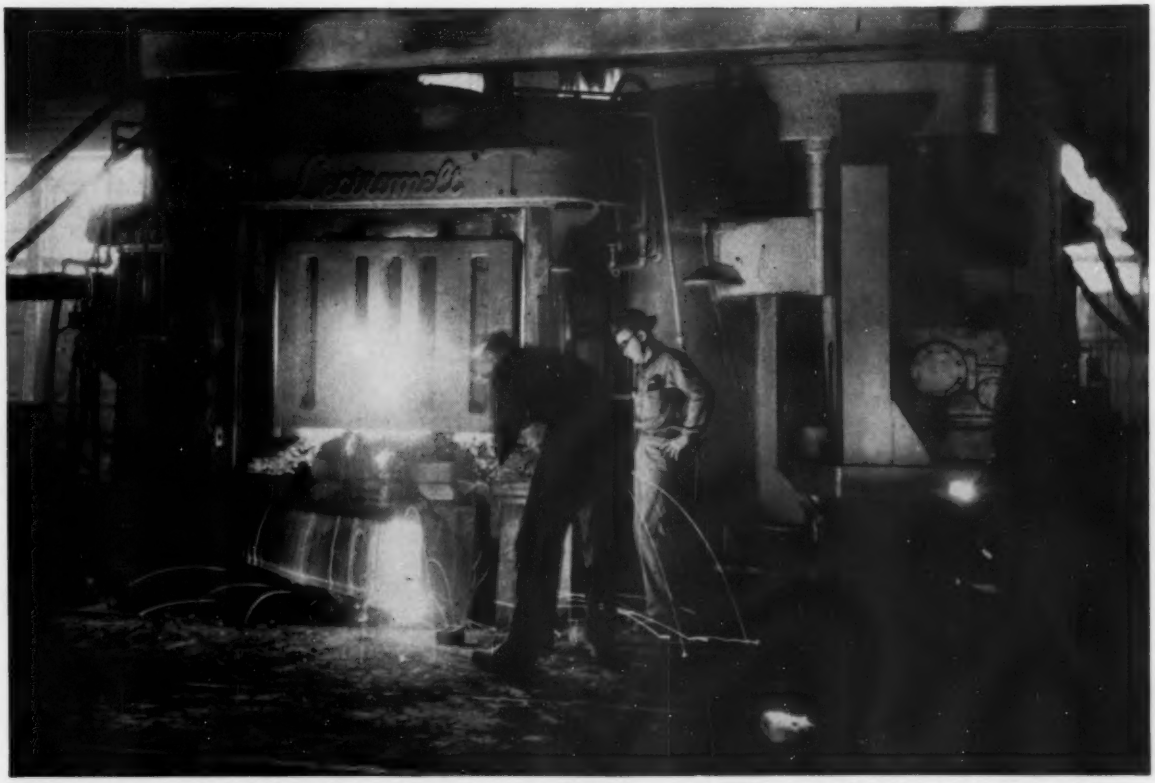


Strict Quality Control Required In Production Of Stainless Steels For Critical Applications

Testing Process at Rotary Electric Steel Co. Continues Through Each Step in Manufacture.

Rotary Electric Steel at Detroit produces in large volume the high quality stainless and alloy steels needed for the automotive, aircraft, chemical, anti-friction bearing, and food handling equipment industries, as well as for critical defense applications. Precise quality control and constant inspection of the steel at each processing step is basic in Rotary's production.

Raw Material—This testing process starts even before the steel is in a molten state. Rotary produces electric furnace steels. The raw material for this steel is not ore, but steel scrap. Rotary uses scrap of the highest quality, to which is added various high grade alloying elements. The first step in quality control starts with the careful selection and grading of the scrap.



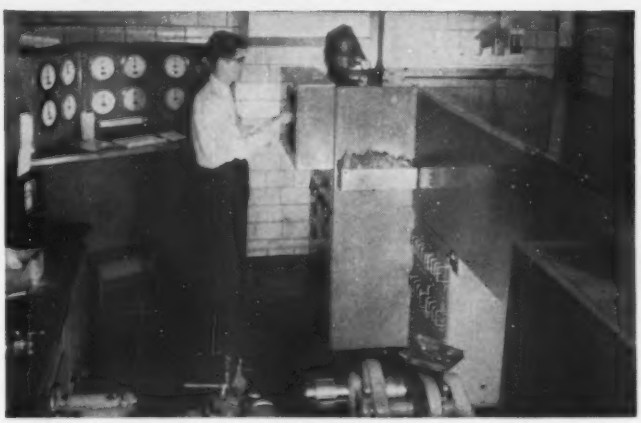
Sample is poured into small mold. Test piece is sent to chemical laboratory through a pneumatic tube for complete analysis.

Melt Shop — During the melting process frequent samples are taken and test pieces are sent through a pneumatic tube to the chemical laboratory for complete analysis. A number of the determinations are made on a direct-reading spectrometer that enables a report on the chemical analysis of the metallic elements in the steel to be made in a matter of minutes. To insure that the steel meets customer specifications, from four to six additional tests are made, and before the steel is poured from the furnace the chemical laboratory approves the heat.

Processing—As the processing continues, at various stages the steel is again analyzed chemically and samples are sumbitted to the metallurgical department for additional tests as required, such as etch tests, tensile tests, magnaflux tests, and cleanliness ratings.

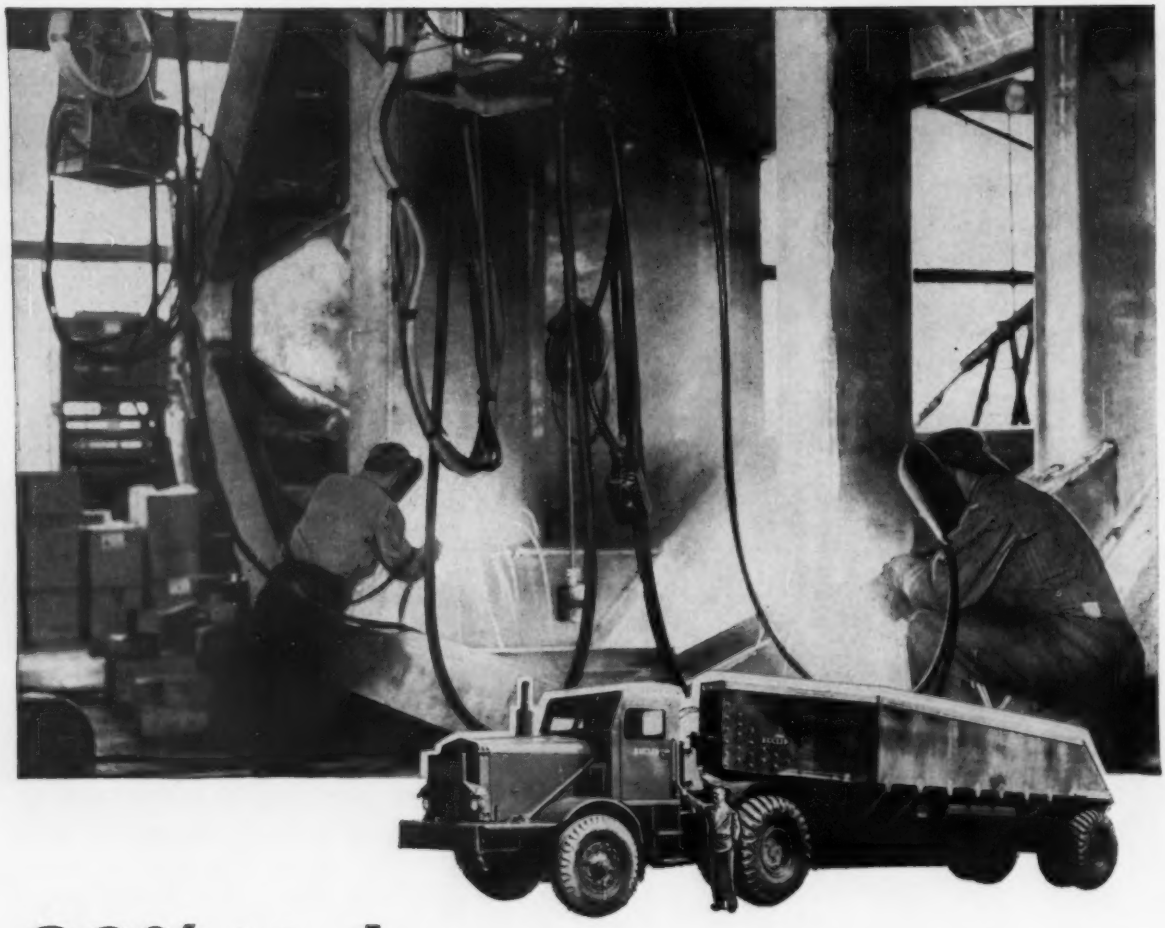
Quality control at Rotary means that every order of steel reaching the shipping department has had metallurgical approval as well as final physical inspection.

New Color Brochure—"How Steel Is Made at Rotary" is a 4-color booklet that shows the plant and facilities of the company. Copies can be obtained by writing Rotary Electric Steel Co., Box 4606, Detroit 34, Michigan. Rotary has sales offices and agents in Detroit, Indianapolis, Newark, N. J., Cleveland, and Chicago.



Portion of the test is run in direct reading spectrometer that gives the chemical analysis of the metallic elements in the steel in a few minutes.

Results of first test are sent to melt shop by telautograph. Four to six additional tests are made at this stage alone.



33% Lighter...

Sigma Welding helps up truck pay-load 5 tons

The less weight consumed in a truck's structure, the more room there is for the all important pay-load. By sigma welding these giant drop-bottom dump trailers of sturdy aluminum alloy, 8,210 lb. dead-weight has been eliminated —and truck capacity increased 5 tons.

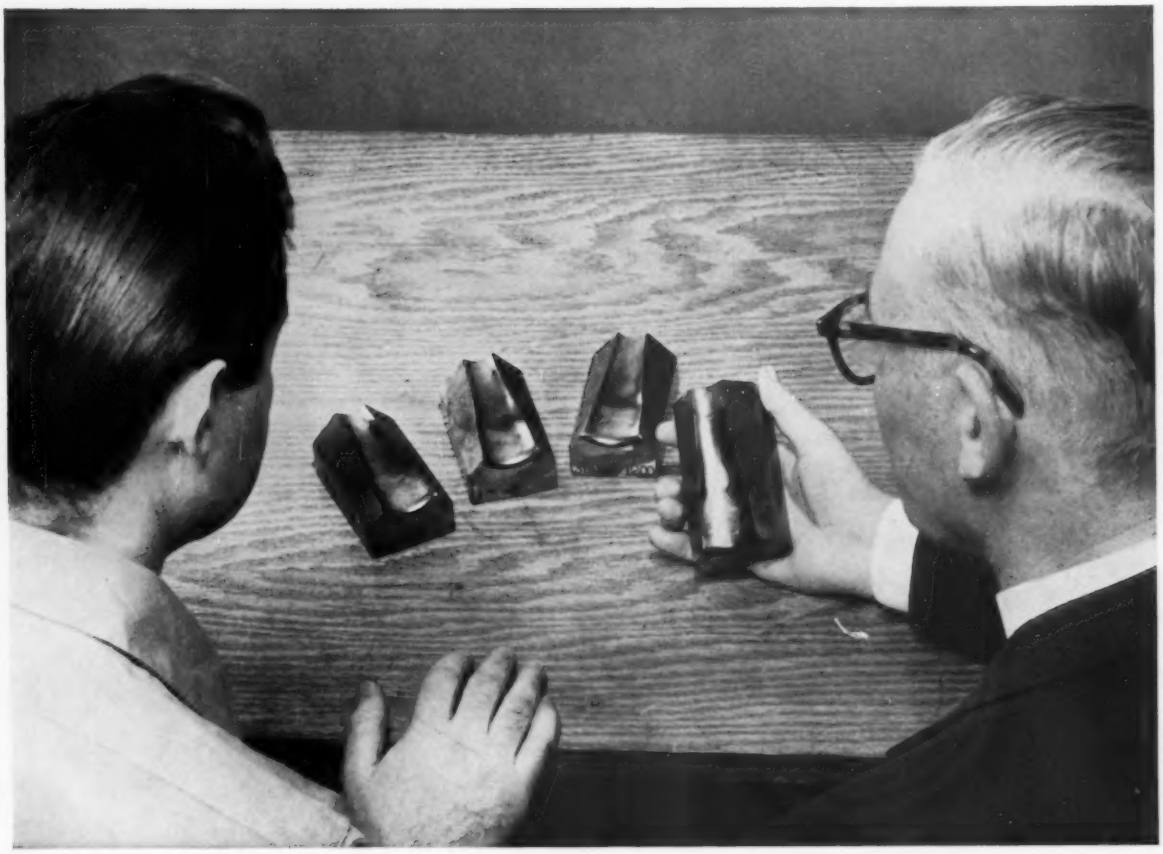
In this operation, sigma rod feed units are suspended above the work area to allow each operator complete freedom of movement with his sigma torch. Sigma welding operations are fast, and finished welds are of highest quality. The 36-ft. long trailers are fabricated of 5/16 and 5/8-in. plate, and 3/8 and 3/4-in. channel extrusions.

Like many other products throughout industry, these trailers are being fabricated with new quality and efficiency using sigma welding with argon shielding. Sigma welding produces smooth, high-quality welds in all type joints, and exceeds 100 in. per min. in many operations. It is an efficient method for joining such metals and alloys as carbon steel, stainless steel, copper, bronze, aluminum, and unalloyed titanium. Start saving now with greater production speed and unit quality—call your local LINDE representative today.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
(formerly Dominion Oxygen Company)
Division of Union Carbide Canada Limited, Toronto

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation.

Linde
Trade-Mark



HOW TO OPEN THE DOOR TO IMPROVED RESULTS FROM THE SPECIALTY STEELS YOU USE

The center of discussion above is a set of hot swedger dies on which replacement costs have been reduced 72%!*

And it's just one more example of how Carpenter's *local Specialized* Warehouse Service is helping countless plants to get new benefits and savings. This local Carpenter service can prove helpful to you too in your use of alloy, stainless and tool steels.

Heading this program is your Carpenter Representative—a *specialist* in ideas and experience for making the most from all types of specialty steels. Supporting him is printed service literature that can simplify or eliminate many of your problems. Metallurgical Counsel is available from the Reading Mill. And a call to the Carpenter order desk provides quick information on prices, sizes and grades.

Behind all this is the direct responsibility of the steel producer to you. It also includes ***Carpenter Quality***... large stocks . . . immediate delivery.

Why work alone when this *specialized* service is so near? Call your *local* Carpenter Mill-Branch Warehouse, Office or Distributor now for ideas that may help to improve your products or production. *The Carpenter Steel Co., 121 W. Bern St., Reading, Pa.*

***Carpenter Specialization**
Reduces Tooling Costs 72%

Production life from the original set of hot swedger dies for pointing hot steel was far from good . . . and toolroom expenses were running too high. Realizing the need for assistance, the company turned to Carpenter for the solution. Since changing from 5% chrome hot work steel to Carpenter T-K Die Steel, tooling and replacement costs have been reduced 72% . . . and production life of the dies has increased nearly 500%.

Carpenter STEEL

Mill-Branch Warehouse Service

IMMEDIATE DELIVERY from large stocks of specialty tool, alloy and stainless steels.

WIN a 2-weeks LUXURY

All Expenses Paid,

ENTER JONES & LAMSON'S

NEW HORIZONS

Grand Prize:

Two-Weeks Luxury Vacation Trip for Two, All Expenses Paid, to a choice of one of the following: Paris, Hawaii, The Caribbean, The Canadian Rockies, Plus $400 for spending money, baby sitter fee, etc.

Two 2nd Prizes: Each a Seven-Day All-Expenses-Paid Luxury Vacation for Two to Bermuda. Plus $200 spending money.

Three 3rd Prizes: Each a Shopmaster Combination Saw-Jointer Power Tool, complete with motor.

Ten 4th Prizes: Each a Shopmaster Individual Single-Purpose Power Tool (A Choice of Saw, Drill Press, Jointer, etc.)

Jones & Lamson, famed for opening up NEW HORIZONS in metalworking efficiency, now offers you, personally, NEW HORIZONS — a luxury vacation for two people for two weeks with all expenses paid, to your choice of Paris, Hawaii, The Caribbean or The Canadian Rockies.

Think of it — you can enjoy deluxe travel, finest hotels and accommodations, the very best of everything, plus $400 spending money. Live like a millionaire for two weeks, for just answering this question, "Which Jones & Lamson machine, or machine feature, could, or does, help you most, and Why?"

When you write in (use coupon or not, as you wish), we will send you an official entry form, together with information upon which to base your answer. So don't delay! Even if you've never entered any contest before . . . if you have a good idea and can express it clearly — *YOU* may win this glorious luxury vacation for two! And don't forget — there are other prizes! — two deluxe 7-day all-expenses-paid vacations for two to Bermuda, and 13 prizes of famous Shopmaster home workshop Power Tools! Enter *today!* Read the simple rules, and send in this coupon *NOW!*

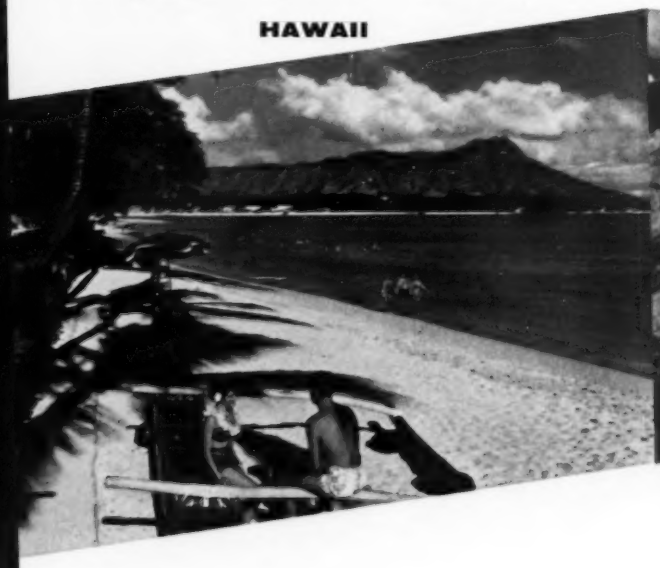
J&L JONES & LAMSON MACHINE COMPANY

511 CLINTON STREET, SPRINGFIELD, VERMONT

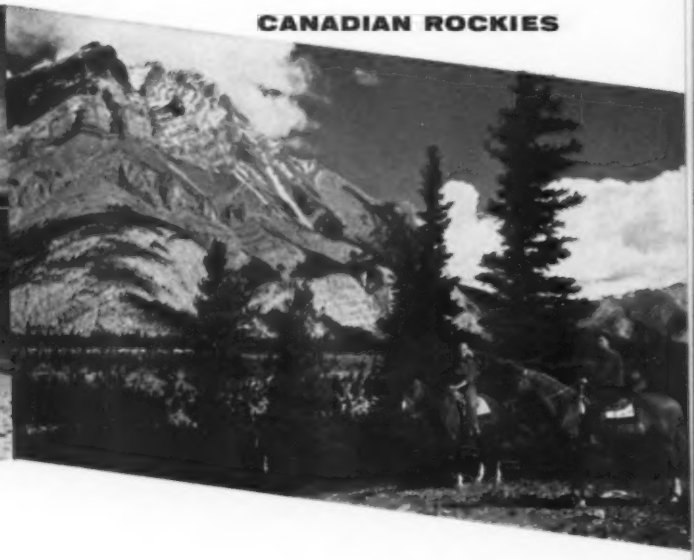
VACATION FOR TWO!

to your choice of . . .

HAWAII



CANADIAN ROCKIES



CONTEST TODAY!

CONTEST RULES

Contest is open to all persons, residing in the continental U. S. A., engaged in metalworking or allied industries, except employees of Jones & Lamson Machine Company, its selling agents and its advertising agency, and members of their families.

Contestants merely answer, in 150 words or less, the question "Which Jones & Lamson Machine, or Machine Feature, could, or does, help you most, and Why?"

Entries are to be mailed to Jones & Lamson NEW HORIZONS CONTEST, Box 364, Back Bay Annex, Boston 17, Massachusetts.

Entry must be contestant's own, and must be handprinted or typed on an official Jones & Lamson NEW HORIZONS CONTEST entry form. Entry forms that are not completely filled out will be disqualified. Entry forms filled out in handwriting will also be disqualified. No entries will be returned, and all entries become the property of Jones & Lamson Machine Company.

The submitting of a contest entry implies the contestant's agreement with and submission to all contest rules. Contest entries must be postmarked by midnight July 10, 1956 and received by July 20, 1956.

Board of Judges will include machine tool engineers, production foremen, business executives, trade publication editors, and an engineering college faculty member.

Judges' decisions are final. Entries will be judged for aptness of thought, originality and sincerity. "Literary style", as such, will *not* be a deciding factor. Elaborate or "fancy" entries will receive no extra consideration.

Winners will be announced in Jones & Lamson Machine Company advertisements in trade publications as soon as possible after the judging of the contest.

Easy to Enter! You Could Win!

JONES & LAMSON MACHINE COMPANY
511 Clinton Street, Springfield, Vermont

Please send official NEW HORIZONS CONTEST entry form and information to:

*Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

Cleveland engineers were told long ago to start with the quality standards of the industry *and work up.*

The result is Cleveland's "Top Quality" that gives you a lot more for your standard and special fastener dollar:

Extra "Physicals" from revolutionary Cleveland-developed Kaufman *double extrusion* Process that cold forges cap screw from oversize wire, prepared under our own close metallurgical controls. *Result*—flow lines follow screw's contour, insuring strong crack-free heads, and threads with sturdy physical properties. Internal ductility is undisturbed, and screw has higher tensile and toughness.

Accurate Forming to extra-close tolerances, so they spin every time smoothly snugly into place . . . real cost saving on your production line! In-process and final inspection and testing guarantee quality.

Service? We maintain ship-at-once stocks of every kind and size we make. Ask your jobber for Clevelands, or check with us on production quantities. Write for current stock list.

The

CLEVELAND CAP SCREW

Company

2929 East 79th Street • Cleveland 4, Ohio
VUlcan 3-3700 TWX CV-42

WAREHOUSES:
CHICAGO • PHILADELPHIA • NEW YORK
PROVIDENCE • LOS ANGELES

See us at Design Engineering Show, Booth 324 and NAPA Inform-A-Show, Booth 237

Originators of the Kaufman DOUBLE EXTRUSION Process

main valve seat for fire plug

Sand-cast pegs bent easily, causing improper fire plug operation. Full line pressure could not be maintained. Machining often uncovered blow-holes causing rejects. Switched to brass forging for higher strength, dense structure, closer tolerances, reduced over-all costs.

multi-port valve body

Porous sand-cast part caused non-detectable leaks in air and fluid system tests. Switch to fine-grained brass forging stopped trouble. Rejections, scrap, costs all reduced. Closer tolerances and better appearance achieved by using brass forging.

base for TV signal transmission

Porosity and blow-holes in sand-cast part caused "high standing wave," or loss of power feeding into TV transmitting tower through base on end of cable. This required tearing down whole assembly at considerable cost. Switch to dense, strong forging eliminated rejects and power leakage.

water meter lid and register box

Lid converted from sand casting to brass forging. Register box from sand casting to pressure die casting. Weight reduced greatly on both — thus lowering costs. Closer tolerances after change eliminated costly machining on the box.

Vital Change

from sand castings to brass forgings

Titan

METAL MANUFACTURING COMPANY

Bellefonte, Pa. Offices and Agencies in Principal Cities

Titan brass forgings are more easily drilled, tapped, broached and milled than are sand castings. Fewer machining rejects result. Forgings are hot-pressed quickly, are denser, tougher and stronger. Moreover, brass forgings have a smooth beauty and warmth not obtainable in sand castings. Scrap is reduced. Some machining operations necessary on sand castings are actually eliminated by switching to accurate-dimensioned forgings. Getting down to brass tacks, what this means to you is lower costs and a better product by switching to Titan hot-pressed brass forgings.

Send us a sample, drawing, and production quantities of sand-cast assembly parts you now use. We'll quote you on changing to brass forgings.

If you want more data on Titan brass forgings, send coupon below:

Dept. B
Titan Metal Manufacturing Co., Bellefonte, Pa.
Gentlemen:

- ☐ Will send sand-cast part and details for you to quote as brass forging
- ☐ Please send further data on Titan brass forgings
- ☐ Have Titan representative call

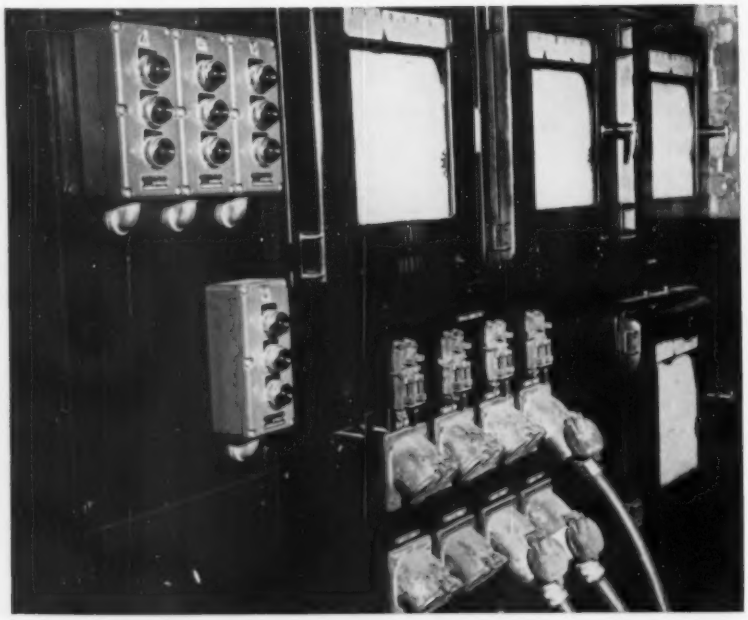
Name_____ Title_____

Company_____

Address_____ City & State_____

RODS • FORGINGS • DIE CASTINGS • WELDING RODS • WIRE Quality Alloys by Brass Specialists

Sharon Steel Improves Annealing Temperature Control With New Thermocouple Circuit Monitoring Device



Pushing a Restorer button on the control panel disconnects the appropriate thermocouple circuit from its pyrometer circuits and puts a test voltage on the thermocouple circuit. A red signal light indicates circuit continuity. Pyrometer readings after button is released are accurate.

Restorer Prolongs Thermocouple Life, Cuts Maintenance of TC Circuits . . .

© Closer annealing temperature control, longer thermocouple life and reduced maintenance on thermocouple circuits and pyrometers has been effected at Sharon Steel Corporation's Roemer Works, Sharon, Pa.

Annealing General Foreman D. H. Jones reports his furnace operators and plant instrument men have made the improvement with the aid of a device for monitoring thermocouple circuits during heat treating operations. The unit is the Restorer, produced by The Peerless Electric Company, Warren, Ohio.

The first Restorer unit, installed on trial in June, 1953, permitted Annealing personnel to repair many couple failures "on the spot" without calling instrument men. Restored couples remained accurate during heats, instead of being replaced at the first sign of failure. Less time was spent checking pyrometers because couple failures account for the majority of troubles.

Sharon Steel installed five more Restorers in late 1953 to check more than 200 thermocouple circuits on its 23 annealing furnaces. This year the firm added new units and will again install Restorer monitor stations.

The furnaces anneal flat rolled steel strip produced by Sharon Steel.

Restorer Checks Thermocouples Automatically . . .

● Another leading basic steel producer uses automatic Restorer units to verify quick immersion-thermocouple checks of molten steel to be tapped from its open hearths.

Automatic Restorers use the same electrical continuity principle as manual models, but they can be preset to operate automatically. They can also be operated manually, when necessary, by a pushbutton or a key-operated switch.

Automatic Restorers are especially suited for monitoring immersion thermocouples in electric arc furnaces, induction furnaces or open hearths. These couples are often not welded and have many plug-type or screw-type connections that are common sources of poor electrical contact and excessive resistance.

The Restorer assures the accuracy of these critical temperature checks by insuring proper continuity between couple and pyrometer.

Seven coils of flat rolled strip steel are ready for annealing at Sharon Steel Corporation. Control couple near top cannot be reached for repair or replacement during heats.

Literature available upon request.

THE

PEERLESS ELECTRIC

COMPANY

1455 W. MARKET ST.

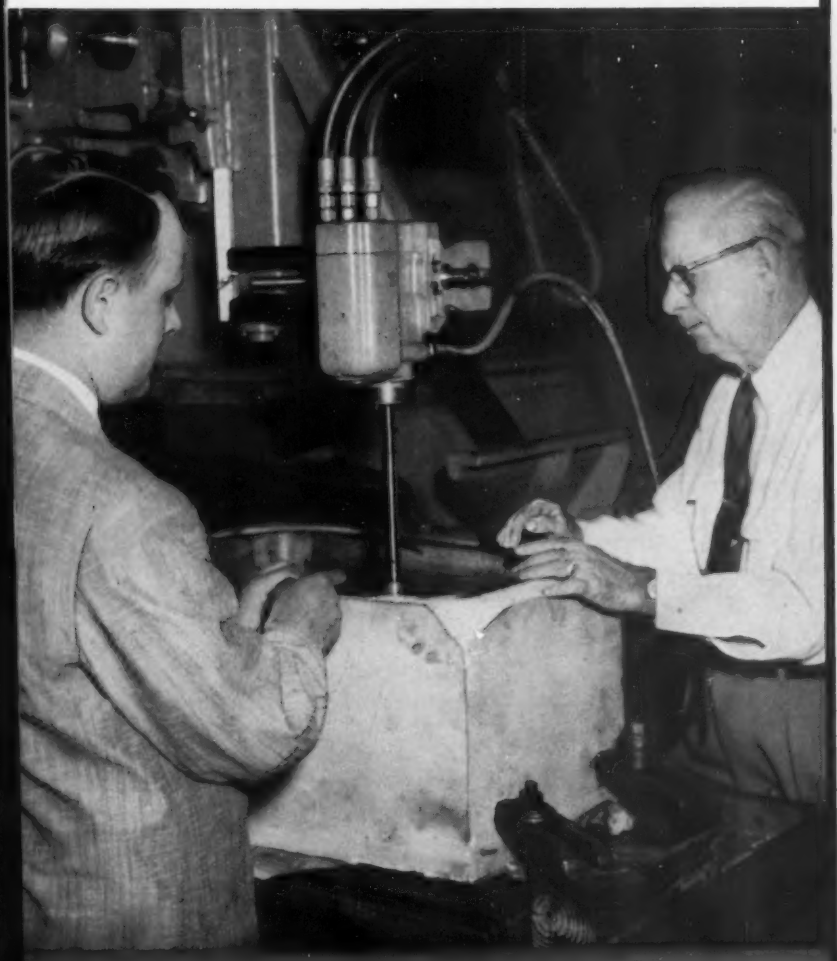
WARREN, OHIO

Established—1893

Manufacturers of

MOTORS • FANS • BLOWERS • ELECTRONIC EQUIPMENT

STANOIL *Industrial Oil*
tough performer in delicate operation



A. T. Wallace (right), President of Wallace Tool and Die Company, and Standard Oil lubrication specialist, H. A. Peterson, check sensitivity of new Cincinnati Hydro-Tel Milling Machine which uses STANOIL as hydraulic medium. Howard Peterson has been providing technical service to customers since joining Standard Oil. He is a graduate of General Motors Institute. Howard's customers find this experience pays off for them.

Delicate operations with metal requiring almost a surgeon's skill are every day stuff to Wallace Tool and Die Company, Indianapolis. Recently, they purchased a Cincinnati Hydro-Tel Milling Machine for their highest precision work. They selected STANOIL Industrial Oil for the hydraulic medium. The reason for choosing STANOIL: they wanted a hydraulic fluid that could deliver high performance. They wanted a clean hydraulic system, free of deposits that might clog filters and interrupt operations. They wanted smooth operation without pump chatter and without foam. They got these with STANOIL.

How did Wallace Tool and Die come to choose STANOIL? The answer is not hard to find. They had used STANOIL for hydraulic systems throughout their plant for many years. It has given them the results they wanted so it was natural to pick STANOIL for their new Cincinnati machine.

With STANOIL the machine performs the delicate operation of contour tracing with only 3½ ounces of pressure needed to control the milling cutters. STANOIL gives them smooth, steady, uninterrupted performance.

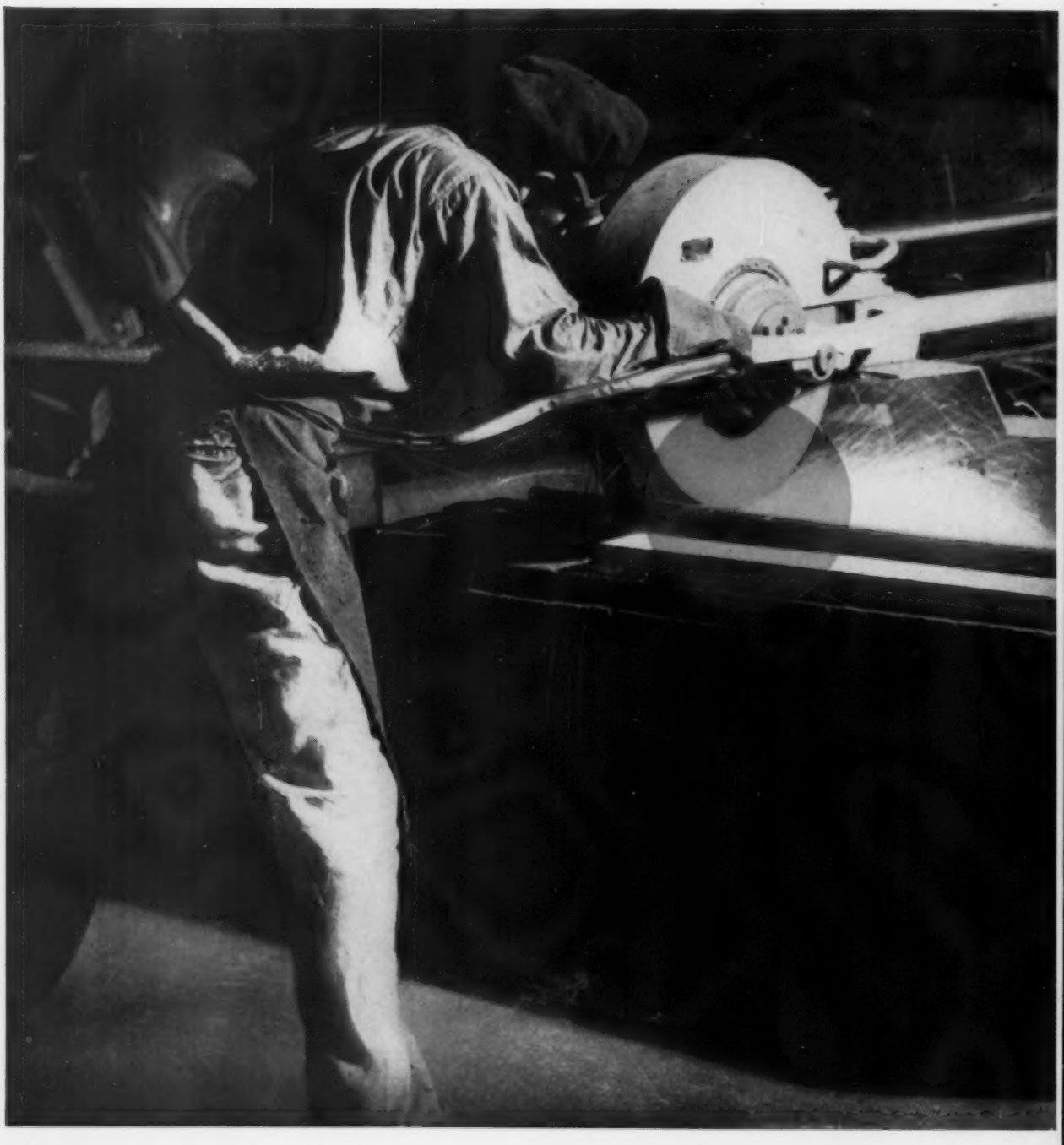
STANOIL can serve you. In the Midwest a lubrication specialist at your nearby Standard Oil office will be glad to show you. Call him. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY (Indiana)

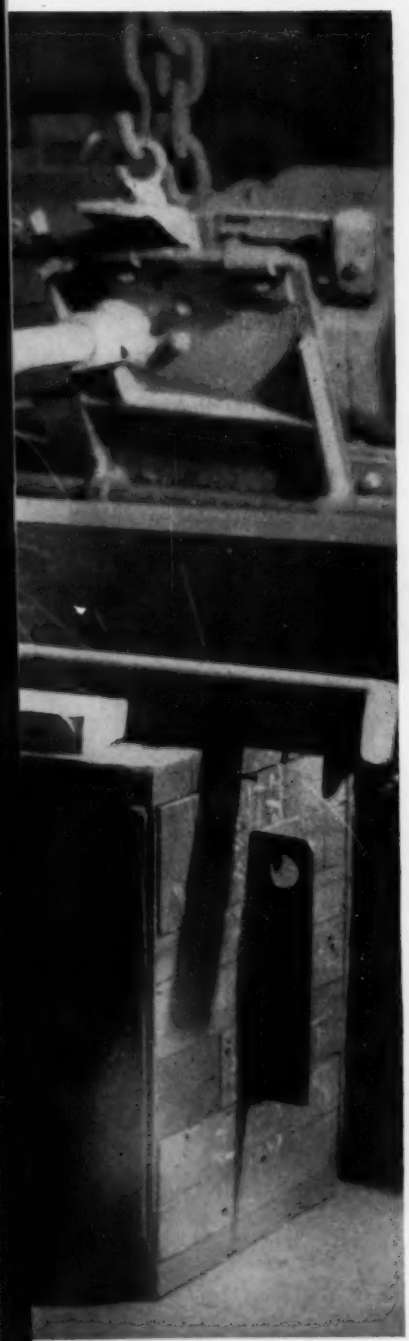
STEEL MILLS!

Condition alloy steel at



lower cost with Norton

BZZ wheels



Get the "TOUCH of GOLD" in your billet grinding

How do you figure your costs of grinding alloy steel billets, slabs, sheet bars and strips?

In terms of

— cost per ton ground?
— cost per pound of metal removed?
— man-hours per ton ground?

Any way you reckon it, Norton BZZ Wheels will register by far the best score on your cost sheet. After six years of developing and field-testing, these exceptional wheels are making good in a big way.

Here are the benefits they're bringing to mills across the country:

Advantages To Management—Lower cost grinding . . . increased productivity . . . greater safety . . . better finish.

Advantages To Operators—Faster cutting . . . easier handling . . . safer.

Let us prove how Norton BZZ Wheels can bring these same advantages — the sure "Touch of Gold" — to your own conditioning of alloy steel. Your Norton Abrasive Engineer will gladly arrange a test in your mill. Or write direct to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities — listed in your telephone directory, yellow pages, under "Grinding Wheels." *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

W-1693

NORTON
ABRASIVES

Making better products . . . to make your products better

TAKE ADVANTAGE OF
FINKL ENGINEERING SERVICES

When you run head-on into a die block or forging problem because of new materials, methods, or products, call a Finkl Sales Engineer. He has a wealth of very valuable information plus the advantage of 76 years of Finkl experience. It is yours for the asking.

Finkl Engineers will help you select the proper size die block, the right steel for the best results, the correct hardness for greater production, or give counsel on any phase of forging practice.

Any resulting specifications can be produced by Finkl craftsmen. Quality is controlled beginning with the making of our own steel to the final super-sonic tests. In every application, Finkl quality has proved that the best is the least expensive in the long run.

When you next consider die blocks or forgings, consider Finkl for the finest. Ask for a Sales Engineer. There is no obligation.

DIE BLOCKS
•
HOT WORK STEELS
•
FORGINGS
•
ELECTRIC FURNACE STEELS

Offices in: DETROIT • CLEVELAND • PITTSBURGH • INDIANAPOLIS
HOUSTON • ALLENTOWN • ST. PAUL • COLORADO SPRINGS
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Warehouses in: CHICAGO • EAST CAMBRIDGE • LOS ANGELES

A. Finkl & Sons Co.
2011 SOUTHPORT AVENUE • CHICAGO 14

"Electromet" 50% Ferrosilicon

Trade-Mark

for FAST deoxidation

Dissolves fast and saves furnace time

Provides close metallurgical control

Keeps open hearth heats uniform

DENSE PRODUCT — ELECTROMET 50 per cent ferrosilicon is a uniformly dense product. The alloy penetrates the slag without delay and goes into solution fast. This provides fast blocking action and saves furnace time.

UNIFORM ANALYSIS — In every shipment of ELECTROMET ferrosilicon, you obtain a uniform product of dependable chemical analysis. This permits close metallurgical control for open hearth steel specifications.

WIDE RANGE OF SIZES — An adequate range of sizes, for both lump and crushed material, allows you to select the size best suited to your melting practice and melting facilities. ELECTROMET ferrosilicon is uniformly-sized from lot to lot.

Lump sizes are: 75 lb. x 4 in.; 8 in. x 4 in. and 5 in. x 2 in.

Crushed sizes include: 4 in. x ½ in.; 2 in. x ½ in.; 1 in. x ¼ in.; ½ in. x Down; ⅜ in. x 12 Mesh; 8 Mesh x Down; and 20 Mesh x Down.

ANALYSIS AND GRADES OF "ELECTROMET" 50% FERROSILICON

Regular Grade	Silicon . . . 47 to 51%
Blocking Grade	Silicon . . . 47 to 51%
Boron-Bearing Grade . .	Silicon . . . 47 to 51% Boron . . . 0.04 to 0.05% or higher if desired
Low-Aluminum Grade . .	Silicon . . . 47 to 51% Aluminum . . max. 0.40% or 0.10%

A SURE SUPPLY PLUS GOOD SERVICE — ELECTROMET 50 per cent ferrosilicon is ready for immediate shipment from six plants and warehouses conveniently located to serve you. Sufficient stocks are kept on hand to meet the varied requirements of ferrosilicon users. Our staff of experienced metallurgical engineers is always ready to give you technical help. For further information about ELECTROMET 50 per cent ferrosilicon, as well as other ELECTROMET ferro-alloys and metals, please contact the nearest ELECTROMET office listed below.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

Electromet

TRADE-MARK

Ferro-Alloys and Metals

ELECTRO METALLURGICAL COMPANY

A Division of Union Carbide and Carbon Corporation

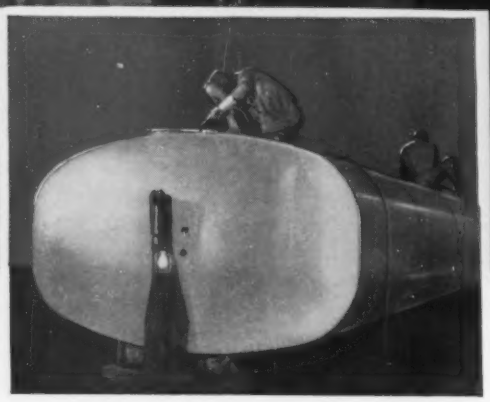
30 East 42nd Street UCC New York 17, N. Y.

OFFICES: Birmingham • Chicago • Cleveland • Detroit
Houston • Los Angeles • New York • Pittsburgh • San Francisco

In Canada: Electro Metallurgical Company, Division of Union Carbide Canada Limited, Welland, Ontario

ENDURO STAINLESS

used for safety and corrosion-resistance



Above, refueling the Viscount at Cleveland Hopkins Airport. At left, a stainless steel filler neck is welded to stainless steel section of the tank at Wilco, Inc., Kenton, Ohio and Shelbyville, Tennessee. There's no weakness here. The welded seams will last as long as the walls themselves.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

STEEL . . .

in refueling the Viscount

A unique tank truck, used in refueling Capital Airlines' new Viscount—the world's first turbo-prop airliner—has been developed by Shell Oil Company and built by Wilco, Inc.

The tank consists of two separate compartments. One containing Shell Fuel is fabricated from Republic 50 High Strength Steel for lightness and strength. The other is fabricated from Republic ENDURO Stainless Steel, Type 302, to resist the corrosive effect of the alcohol-water mixture. The two compartments are then welded together into one strong, integral unit.

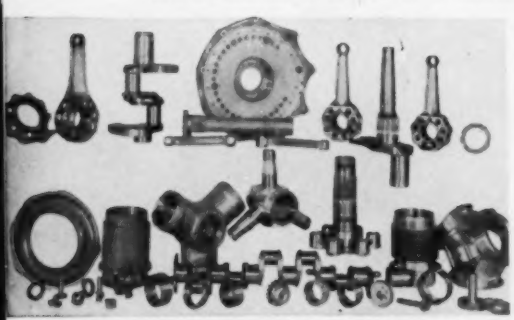
ENDURO Stainless Steel has literally thousands of both ground and air applications. And it is economical to use because it does so many jobs so well at the lowest ultimate cost.

You can use ENDURO in thinner, lighter sections to save weight or gain space without loss of strength, without sacrifice of safety. ENDURO's exceptionally high strength-to-weight ratio and fatigue-resistance provide these bonus benefits.

ENDURO has proved its ability to resist heat in countless applications including compressors, turbines, after-burners, fire-walls and shrouding. Now it is replacing other metals that cannot retain their strength at the high temperatures produced by air friction at supersonic speeds.

Republic is the world's largest producer of aircraft steels—stainless steel, alloy steel and titanium. Our metallurgists and engineers are ready to help you apply them to your design or development work. Just send the coupon for more information.

OTHER REPUBLIC PRODUCTS FOR THE AIRCRAFT INDUSTRY



ALLOY STEELS are exceptionally strong. Their high strength-to-weight ratio permits smaller sections to carry heavier loads at higher speeds with no sacrifice in strength or safety. These fine steels lengthen service life in all types of parts and equipment. Republic metallurgists will help you use these steels to the best advantage.

TITANIUM can save hundreds of pounds per plane. Its lightweight and high strength factors plus an outstanding resistance to corrosion make it an extremely attractive metal for use in nacelle construction, firewalls, frames, etc. Republic produces titanium and titanium alloys in hot rolled and cold drawn bars, sheets, plates and billets.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-1503
3104 East 45th Street
Cleveland 27, Ohio

Please send more information on:
☐ ENDURO® Stainless Steels ☐ Alloy Steels ☐ Titanium

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

this 140-TON horizontal milling machine

There's never been one like it before!

Just a press of a button puts this mighty Schiess into action. A 25-ft. high column moves smoothly along 45-ft. long bedways. Never a vibration—no chatter—even at maximum transversal loads! The new Schiess design of the spindle heads has eliminated this!

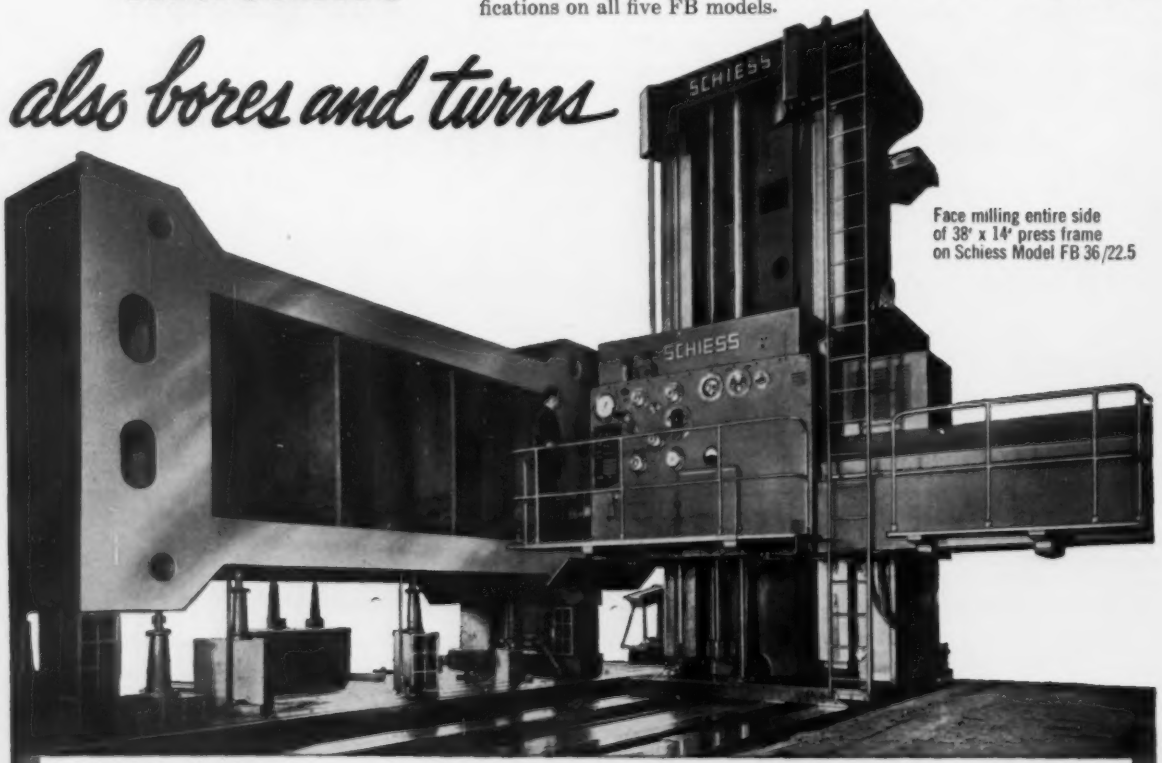
THE MILLING OPERATION. A huge tungsten-carbide cutter in a 14¼" spindle goes to work on the stock. And performs its operation with a consistent accuracy—a surface-finish count—never before obtainable on such a big fellow.

THE BORING OPERATION. Another press of a button! Another spindle goes to work—bores a 79" depth in one cut—or a total depth of 118". Boring and milling spindles are provided with 36 speeds of which the top 12 are V-belt transmitted. Rapid traverse, feeds and manual controls of the two spindles are completely independent.

That this mighty machine has tremendous productive capacity is self-evident. And its productivity goes far beyond conventional milling and boring. Schiess attachments increase its scope to taper-milling, thread-cutting, copying and, in certain instances, copying in 3 dimensions. It's a time saver, too. Can go from feed to rapid traverse immediately, without complicated adjustments.

The Schiess Model FB 36/22.5 Horizontal Milling and Boring Machine is a product of Europe's largest builder of heavy machine tools. Parts and service are as close as Pittsburgh. An American Schiess Engineer will be happy to help you size up these heavy producers for your heavy production needs. Write for catalogs and complete specifications on all five FB models.

also bores and turns



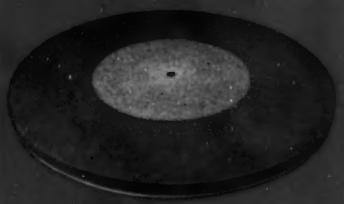
Face milling entire side of 38' x 14' press frame on Schiess Model FB 36/22.5

Engineering Division
AMERICAN SCHIESS CORPORATION
1232 Penn Avenue, Pittsburgh 22, Pennsylvania

Sole Distributor
KO KURT ORBAN COMPANY, INC.
34 Exchange Place, Jersey City, N. J.

Gardner Wire-Lokt® Discs

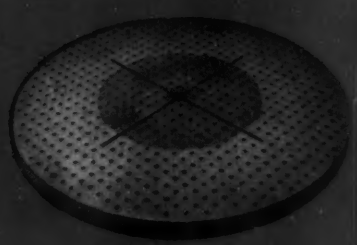
Smooth face for most general purpose grinding jobs



Combination grade maintains a uniform flat surface for the job requirement

Deep corrugated face provides fast, cool cutting

Combined smooth and corrugated face for shear cuts, cool cutting and good chip clearance



Combination grade and face with radial lines for even wear, cool cutting and uniform coolant distribution

How Gardner cuts grinding costs with the right abrasive for the job

—by recommending right type, grade and grain

—by selecting the best cutting surface

and

—by accuracy in filling repeat orders

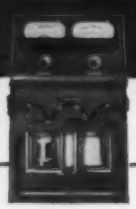
GARDNER

abrasive discs

BELOIT, WISCONSIN

THIS IS INLAND STEEL!

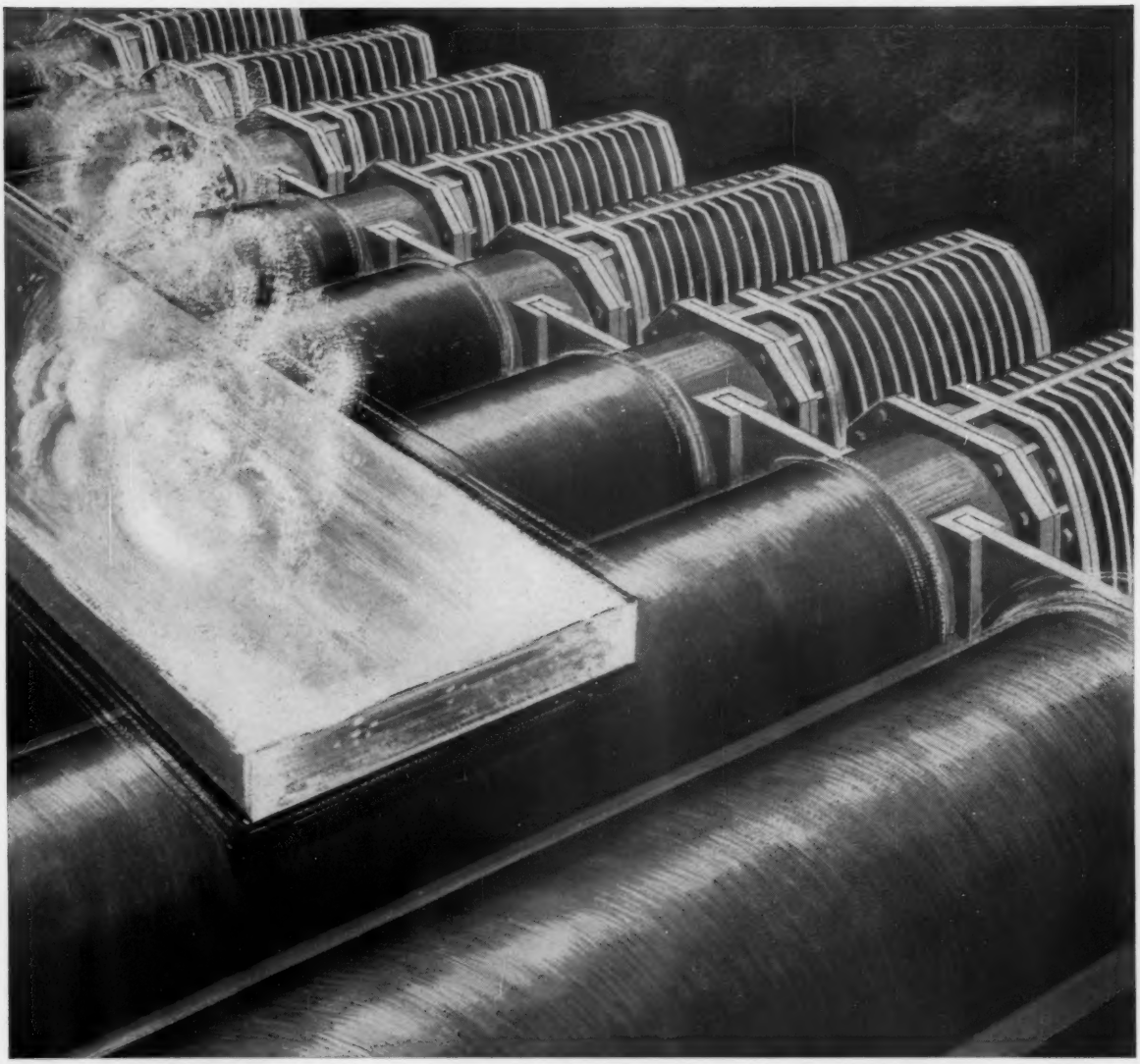
The Cities Service Heat Prover Works Here



THE PORTABLE HEAT PROVER is supplied and maintained free by Cities Service. It helps control combustion efficiency by allowing rapid, continuous sampling, simultaneous readings and direct measurement of oxygen and combustibles. Inland uses the Heat Prover for its blast furnaces, open hearths, soaking pits, continuous galvanizing line, reheat furnaces, purging operations, annealers, and boilers on ore ships.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



LOEWY individually-driven motor-rollers eliminate production shut-downs

How much production is lost in *your* mill when line-shaft-driven table-rollers break down?

You can eliminate these costly shut-downs forever by installing Loewy individually-driven motor-rollers. These table-rollers are interchangeable—quick, easy to install. Straight or curved conveyor lines can be formed as required.

Consider these advantages of Loewy motor-rollers:

- **No need for generator or transformer. Units connect directly to AC feed line.**
- **Specially designed motor has high starting torque and is ideal for start-stop operation. Can be stalled temporarily under full load without damage.**
- **Roller speed adjusts automatically to weight of load.**
- **No gearing required—virtually no maintenance.**
- **Never a roller shut-down; rollers will idle in case of emergency.**

Loewy motor-rollers are available in a variety of sizes, for handling hot material in structural mills, for merchant mills, slabbing mills, pipe mills and for every heavy-duty application. Get the details about this rugged equipment. For your copy of the motor-roller bulletin, write to us at 350-B Fifth Avenue, New York 1, New York.

BALDWIN BLH LIMA-HAMILTON

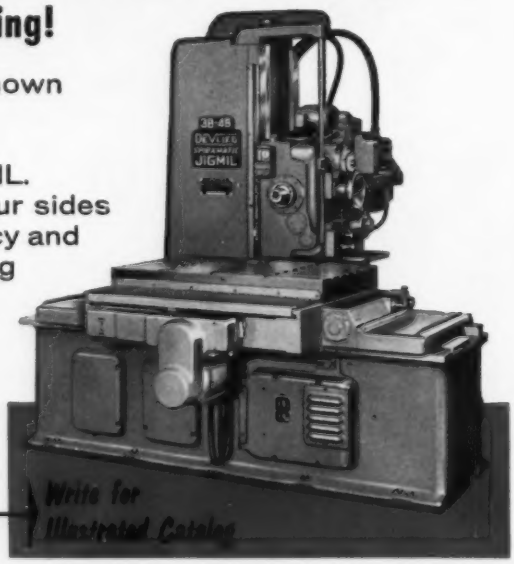
LOEWY-HYDROPRESS
BALDWIN-LIMA-HAMILTON
DIVISIONS: Austin-Western • Eddystone • Hamilton • Electronics & Instrumentation • Lima • Madsen • Loewy-Hydropress • Pelton • Standard Steel Works

DIFFICULT JOBS ARE *routine on* DE VLIEG *SPIRAMATIC* JIGMILS®

PHOTO COURTESY OF DANROY BORING CO.

DeVlieg *SPIRAMATIC* JIGMILS® permit accurate machining of workpiece from 4 sides at 1 setting!

The above photograph, taken in a well known Detroit Tool Shop, illustrates a Special Hydraulic Fixture being machined on a DeVlieg Model 3B-48 *SPIRAMATIC* JIGMIL. This job was completely machined on four sides at one setting to precise limits of accuracy and operations included drilling, boring, milling and O.D. turning 22″ diameter trunnion.



Come to Detroit...

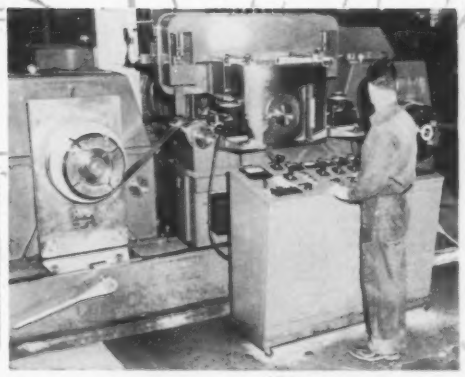
See a practical demonstration of the JIGMIL Technique

DE VLIEG MACHINE COMPANY

450 Fair Avenue, Ferndale • Detroit 20, Michigan

RELIANCE V★S DRIVE®

TAKES ANY QUESTION OUT OF SPECIALTY METAL ROLLING



Top quality specialty-metal for pressure gauges, instrument springs, diaphragms, and other devices is rolled on this highly flexible Sendzimir mill at Beryllium Corporation.

Roughing, breakdown and finish passes are made with precision control, all on one mill, at speeds from 0-400 fpm. Small coils are used to eliminate intermediate annealing.

A Reliance V★S Drive takes any question out of this type of manufacturing . . . by providing close control of tension, variable speed for all gauges, smooth acceleration and deceleration, dynamic braking, and other features. All guess work is eliminated, with improved quality!

Reliance V★S Drives are solving difficult industrial problems everywhere. What's *your* drive problem?

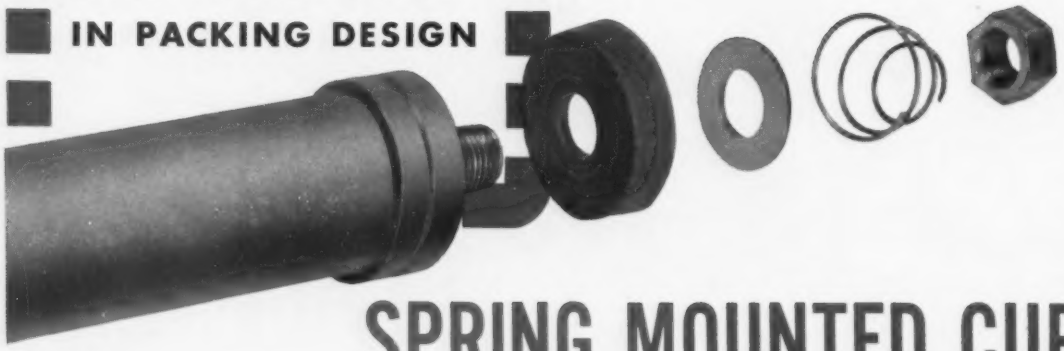
Write for Bulletin D-2311. D-1814

RELIANCE ELECTRIC AND ENGINEERING CO.

CLEVELAND 10, OHIO • OFFICES IN PRINCIPAL CITIES

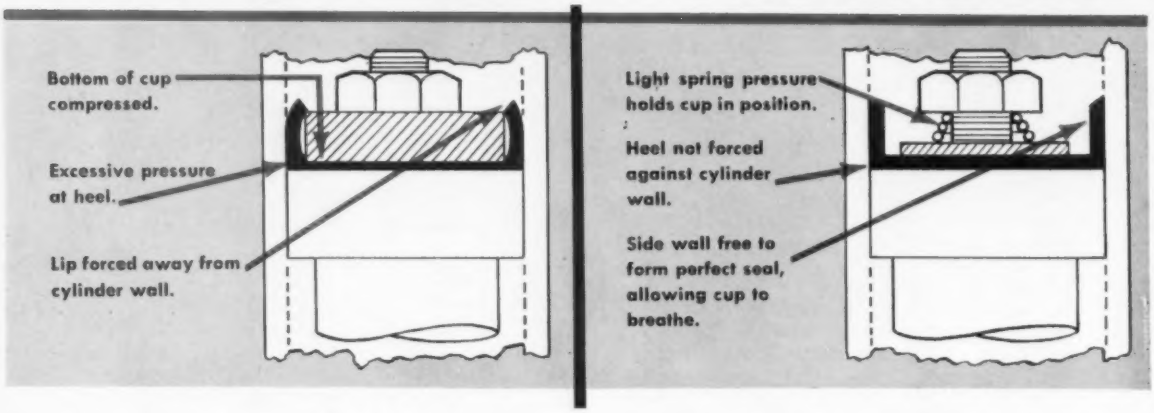
Canadian Division: Welland, Ontario

ANOTHER
NEW DEVELOPMENT
IN PACKING DESIGN



SPRING MOUNTED CUPS

Provide Better Seal.....Reduce Friction


Bottom of cup compressed.
Excessive pressure at heel.
Lip forced away from cylinder wall.
Light spring pressure holds cup in position.
Heel not forced against cylinder wall.
Side wall free to form perfect seal, allowing cup to breathe.

Houghton hydraulic research has come up with one of the chief answers to the problem of excessive friction, short cup life and chatter so often encountered in cup packing installations. Now, instead of the squeezing action of bolting the cup packing in place between the piston and the follower plate, you can use a spring mounting with preformed cup packings. The illustrations show the obvious advantages.

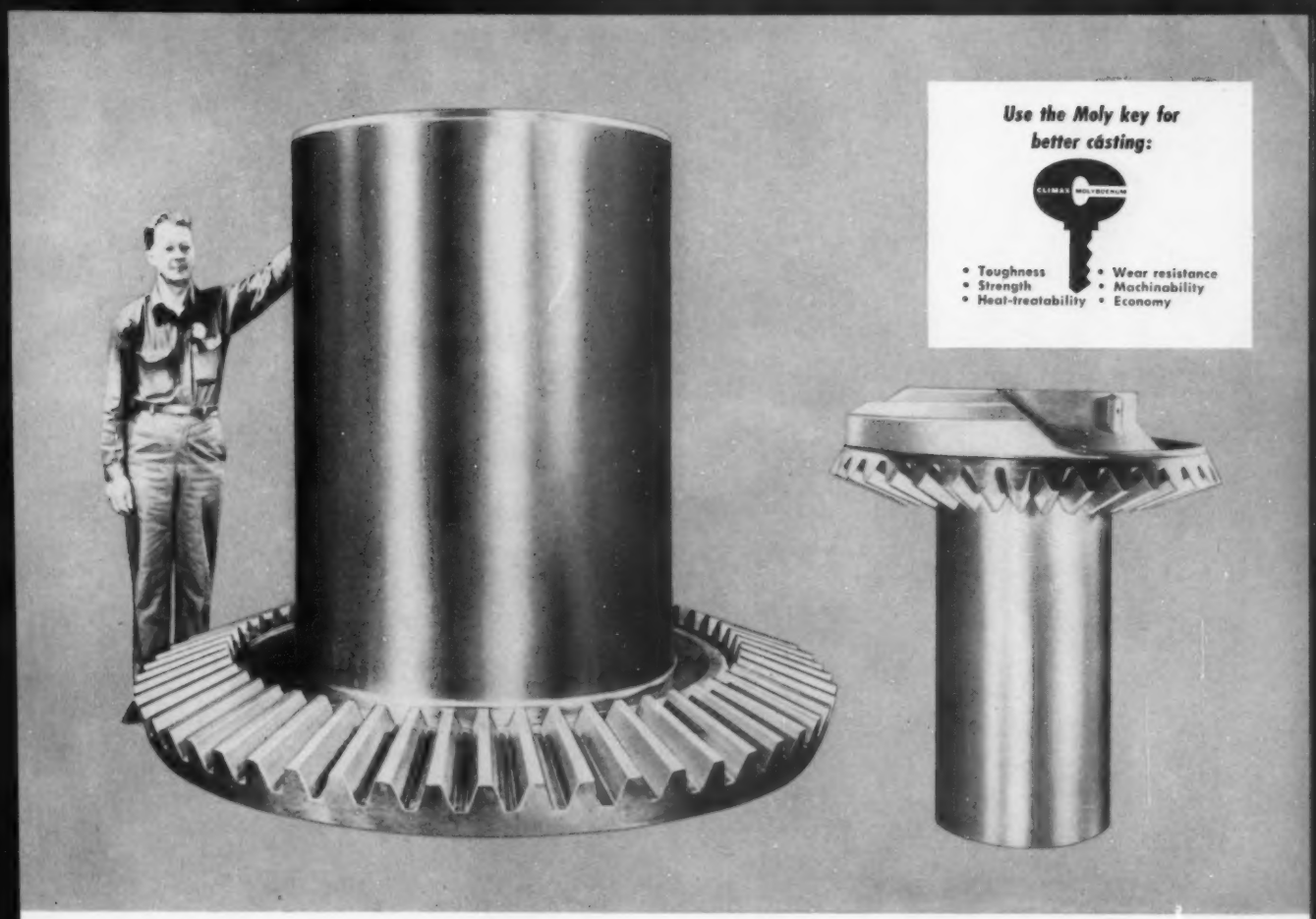
This leadership in hydraulic know-how is typical of Houghton, which makes all types of hydraulic and pneumatic packings, as well as a complete line of hydraulic oils and fluids.

Standardize on Houghton. You'll get the newest first—and the best always. Call your Houghton Man. He will explain their Hydraulic Service. E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Pa.

. . . products of

E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

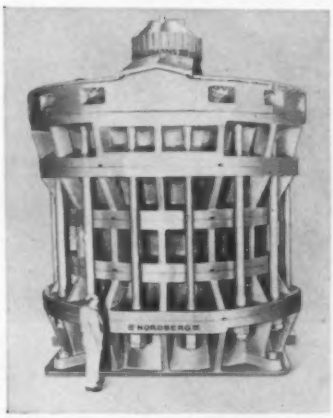


Heavy duty ore crushing machinery is subjected to severe operating conditions. To meet these strenuous requirements the gears shown are made from heat treated low-alloy manganese-*Molybdenum* steel castings. At left: a Symons Gyratory Crusher gear; right: a Symons Cone Crusher gear. Built by Nordberg Mfg. Co.

Cast Manganese Moly Steel contributes strength and toughness to Crushers built by Nordberg

"Where high strength and toughness are prime considerations," says Howard Zoerb, Consulting Engineer of the Nordberg Crusher Division, "molybdenum bearing steels are specified. This is true of the heavy duty parts of Symons® Crushers, built by Nordberg. These steels have contributed to the Nordberg reputation as producers of dependable, heavy duty crushing machinery."

Technical assistance is available to foundries on alloying problems. Please address inquiries on your foundry letterhead to: Climax Molybdenum Company, Department MF2, 500 Fifth Avenue, New York 36, New York.



The Symons Cone Crusher is a product of Nordberg Manufacturing Company.

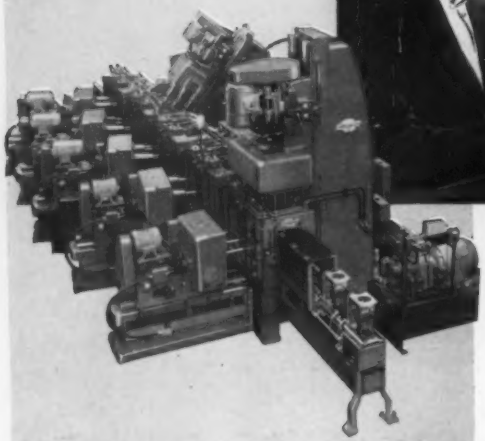
CLIMAX MOLYBDENUM

GREENLEE OFFERS

A PROFIT-MAKING INVESTMENT IN HIGH-PRODUCTION MACHINE TOOLS

Greenlee Six-Spindle Automatic Bar Machine.

Greenlee 22-Station Automatic Transfer Machine for machining transmission cases.



Greenlee creative thinking, Greenlee engineering and Greenlee experience combined with that of your own engineers will help you "produce more at lower cost."

Ideas, engineering, experience and facilities of Greenlee Bros. & Co. develop improved methods and machines for greater and greater productivity of future models.

Greenlee's adequate facilities expedite the transition from production ideas to production machines . . . a profit-making investment at work in your plant.

Greenlee 10-Station Automatic Transfer Machine.

GREENLEE STANDARD AND SPECIAL MACHINE TOOLS

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer Precision Boring Machines

Write for Further Information

GREENLEE

GREENLEE BROS. & CO.
1804 Mason Ave.
Rockford, Illinois

What are your refractory castable problems ?

- High Temperatures?
- Abrasion and Erosion?
- Slag Attack?
- Overhead Applications?
- Insulating Properties Required?

B&W makes a wide range of specialized refractory castables. Whatever your problem, you will find helpful data in B&W Bulletin R-35. Send for your copy today.

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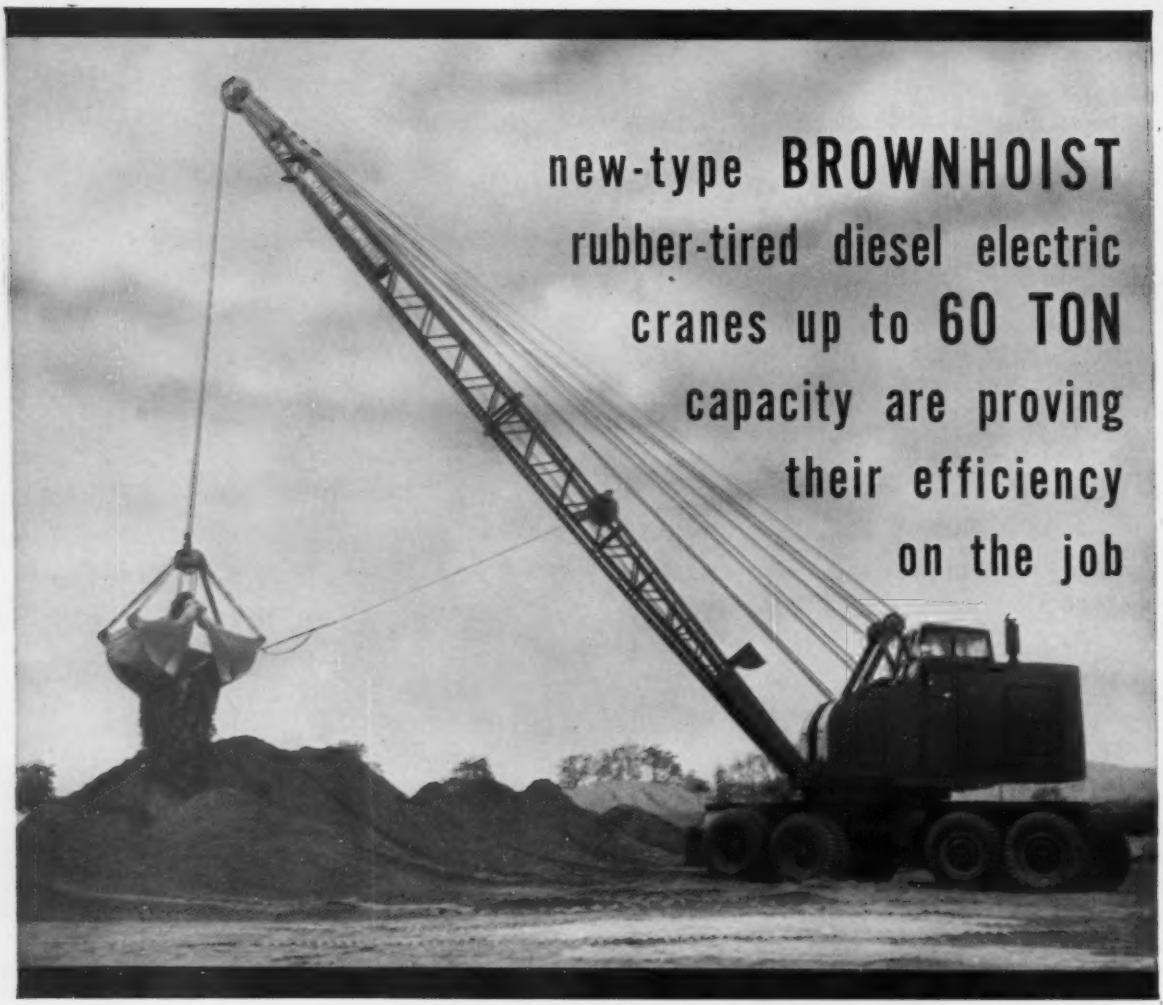
BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars • B&W Silicon Carbide



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BROWNHOIST MATERIAL HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, Chicago, Denver, San Francisco, Montreal • AGENCIES: Detroit, Birmingham, Houston

The new Brownhoist Wagon-Cranes are specifically designed to do an outstanding job wherever high mobility and high capacity are required. You'll see them at work performing heavy duty jobs in mines, quarries, steel mills, for railroad and lumber operations and for many other large industries. Equipped with dynamatic clutch, anti-friction bearings at all essential points, power steering, electric travel and electric rotation. Mounted on a 12 wheel crane carrier capable of speeds up to 8 miles per hour, the unit can be operated by one man from easy-to-reach controls. Economical to operate. Available in capacities from 25 to 60 tons. For specification folder or further details, get in touch with our nearest representative or write us at Bay City.

SUBSIDIARY OF Penn-Texas CORPORATION

BROWNHOIST

STERLING'S

"STERDENSE"

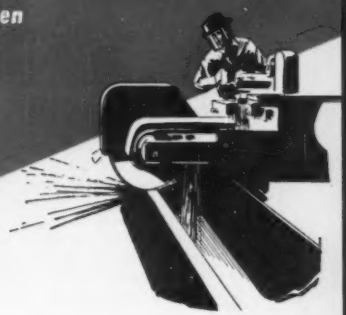
SNAGGING WHEEL
FOR HEAVY PRESSURE GRINDING

Provides an unusual abrasive structure to obtain superior steel mill grinding, especially for heavy pressures . . .

"Note the structural difference between STERDENSE and ordinary wheels."

Sterdense Structure

Ordinary Structure



Sterling's New Sterdense Grinding Wheel is now available to steel mill slab and billet departments. Based upon an idea that a tool, firmly held, will do more, better and faster, this new grinding wheel has an extra-dense, compact bond to hold the sharp, abrasive grains firmly and rigidly until *all* their cutting value has been used.

As a result, Sterling's New Sterdense Wheel offers more metal removal per minute, and at the same time, provides a cooler grinding, longer-lasting abrasive unit, for heavy pressure work.

A test of Sterdense in your billet or slab grinding department will quickly prove the startling advancement that has been made with this new Sterling product. Our abrasive engineers, skilled in the application of the Sterdense Wheel to steel mill grinding problems, will welcome your inquiry. Write or wire us today.

The entire Sterling grinding wheel line is described and priced in the new catalog No. 2-55. Send for it today.

"THE WHEELS OF INDUSTRY"
STERLING ABRASIVES

STERLING GRINDING WHEEL CO., TIFFIN, OHIO

A SUBSIDIARY OF

ABRASIVE AND METAL PRODUCTS CO.

A&MP COMPANY

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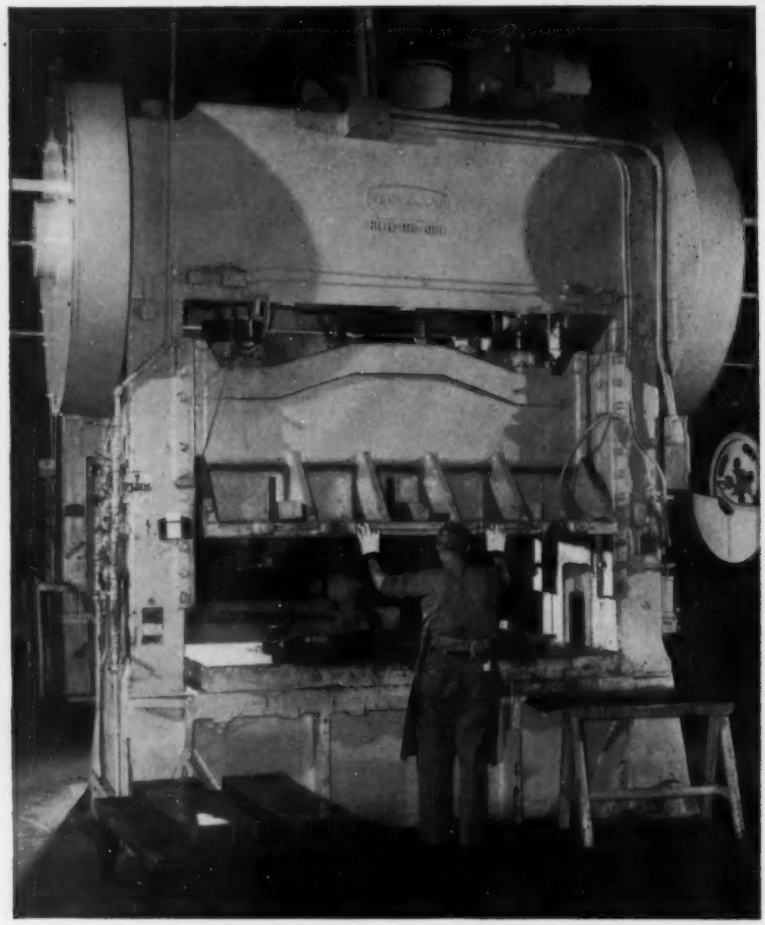

The Cleveland Double-Crank Press shown here draws more than seven parts for the famous Servel Refrigerator.

SERVEL, INC. finds Cleveland Presses

"require very little maintenance . . . have no clutch problems"

Installed in the Home Appliance Division of SERVEL, INC., Evansville, Indiana, in March of 1951, the Cleveland Double Crank Press you see here has been constantly "on the job" producing parts for famous Servel refrigerators.

Carl Linke, Foreman of the Sheet Metal Department, says, "This Cleveland 80D is a good press. We've used it for most of our draw work for the past five years. During this time it has required very little maintenance. We've had no clutch maintenance problems."

As have many of the nation's leading stamping departments, you, too, will find that Cleveland Presses prove themselves to be easy-to-maintain, low-cost producers. Before buying your next press be sure you have the complete Cleveland story. One of the 11 specialized types of Cleveland Presses is sure to be your answer to greater stamping economy. Write or call today!

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES – FABRICATING TOOLS

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CITY FOUNDRY DIVISION · SMALL TOOL DEPARTMENT

The break that gave seamless tubing its start

Over seventy years ago the Mannesmann story began while Max and Reinhard Mannesmann, sons of a German file manufacturer, were investigating the development of centralized holes in steel bars that had been rounded and polished on a skewed-roll reeling machine. Their experiments proved that the faults were caused by the reeling process. Suddenly it occurred to the Mannesmann brothers that the same rolling technique could be carried to an extreme to produce a hollow tube.

There is probably no better way to highlight the importance of this discovery than to quote the American Iron and Steel Institute when it described the process of making seamless tubing as "THE GREAT PIPE TRICK," calling it "one of the neatest achievements of the Steel Industry," when "putting a hole down the middle of a tough steel round and leaving no visible trace of how it got there."

Today in nine out of ten seamless mills around the world Mannesmann piercing mills perform the great pipe trick up to 250 times per hour to meet the needs of the oil industry, to help make more efficient boilers and to satisfy the growing demand for seamless tubing all over the world.

The great pipe trick is only one of the many "Firsts" linked with the name Mannesmann. Now the American Company, Mannesmann-Meer, brings to U. S. metal producers a combination of know-how, nowhere else available, that is based upon

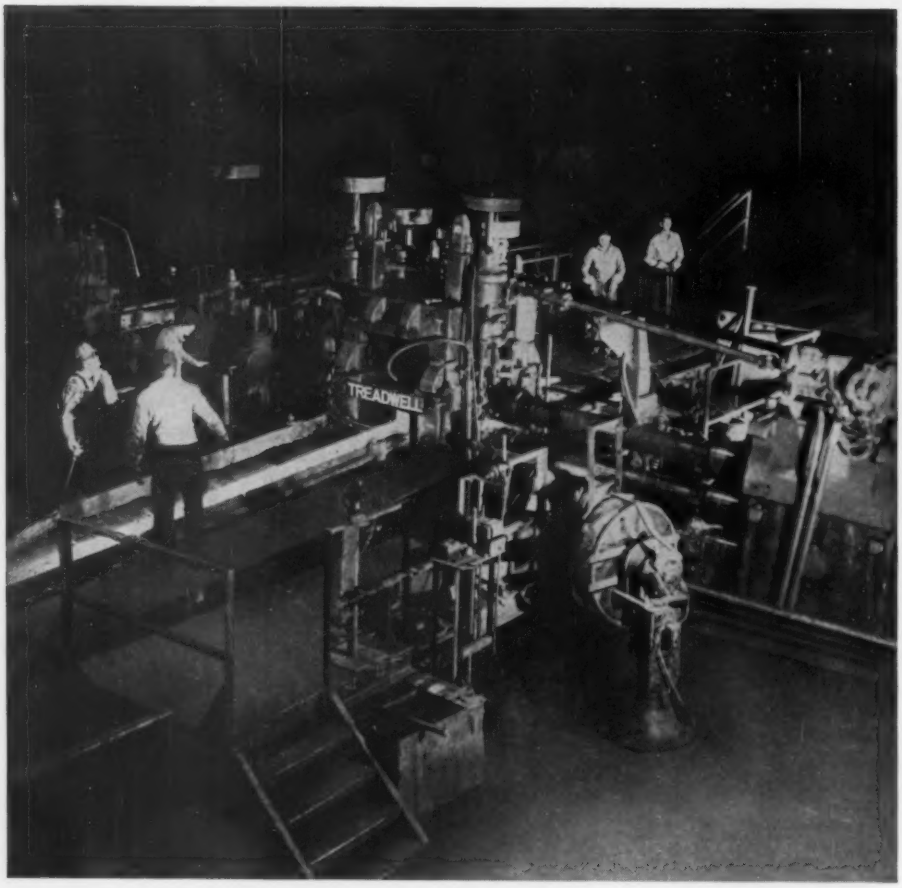
- **CREATIVE ENGINEERING**
- **DESIGN EXPERIENCE**
- **OPERATING BACKGROUND**
- **AMERICAN MANUFACTURING SKILL**

and is ready to get to work on your pipe and tube mill problems. Let us know what they are. *Mannesmann-Meer Eng. & Constr. Co., Inc., 900 Line St., Easton, Pa.*

MANNESMANN-MEER

World Specialists in High-Speed Tube Mill Machinery

Treadwell



Three-High Mill for rolling precision rounds and squares up to and including 5" round or square. The mill is equipped with motor operated screw-downs for both top and bottom rolls.

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Mills, Blooming & Billet
Mills, Merchant & Bar
Mills, Rod
Mills, Sheet
Mills, Strip (Cold)
Mills, Strip (Hot) & Skelp
Mills, Vertical Edging
Tables, Mill
Tables, Tilting & Lift
Tables, Transfer
Transfers

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Conveyors, Coil
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Beds, Inspection
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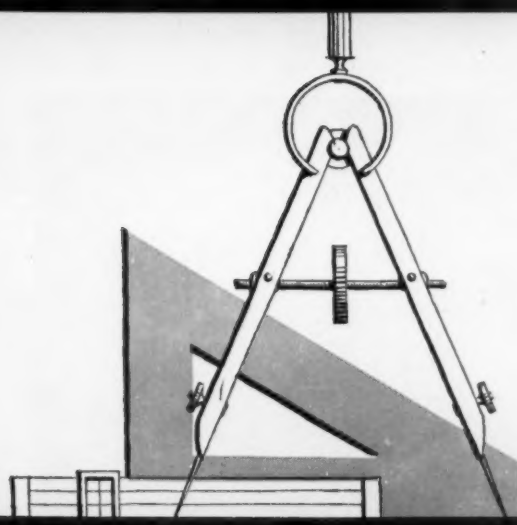
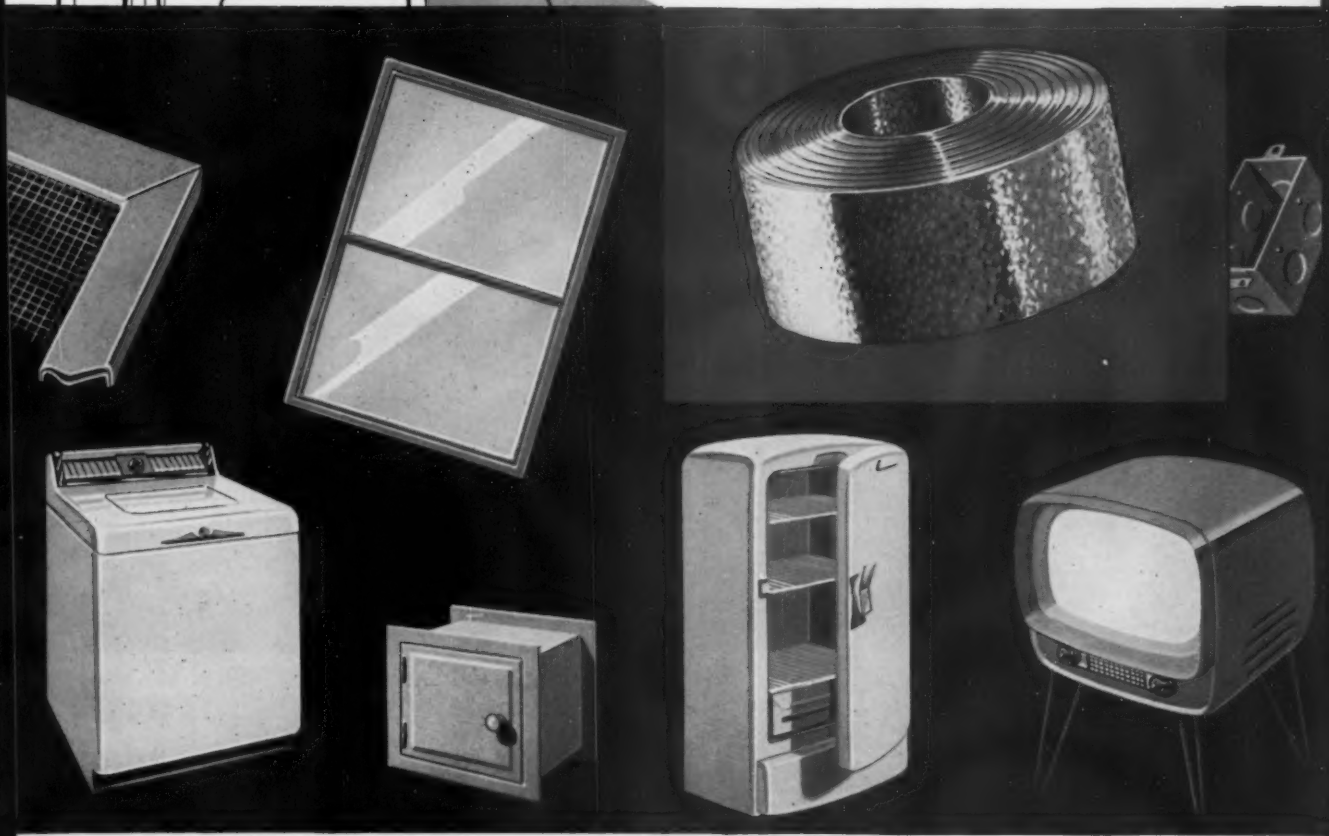


put these bonus advantages of WEIRKOTE galvanized steel to work for you!



For appliances, for other steel products . . . when the job calls for galvanized steel, Weirkote does that job *better.*

Weirkote is made by a special continuous galvanizing process . . . and a tight zinc coating is applied. Result: Weirkote is resistant to peeling, cracking and flaking, even under the severest stresses of fabrication. The coating stays uniform, flows evenly with the base metal, and holds fast under the deepest draws. Amazingly corrosion-resistant, too!

These are just a few of Weirkote's *bonuses* in durability, economy, customer satisfaction. Make it a point to investigate Weirkote from Weirton! Remember: *In the long run, galvanized steel . . . in the LONGER run, WEIRKOTE.*

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

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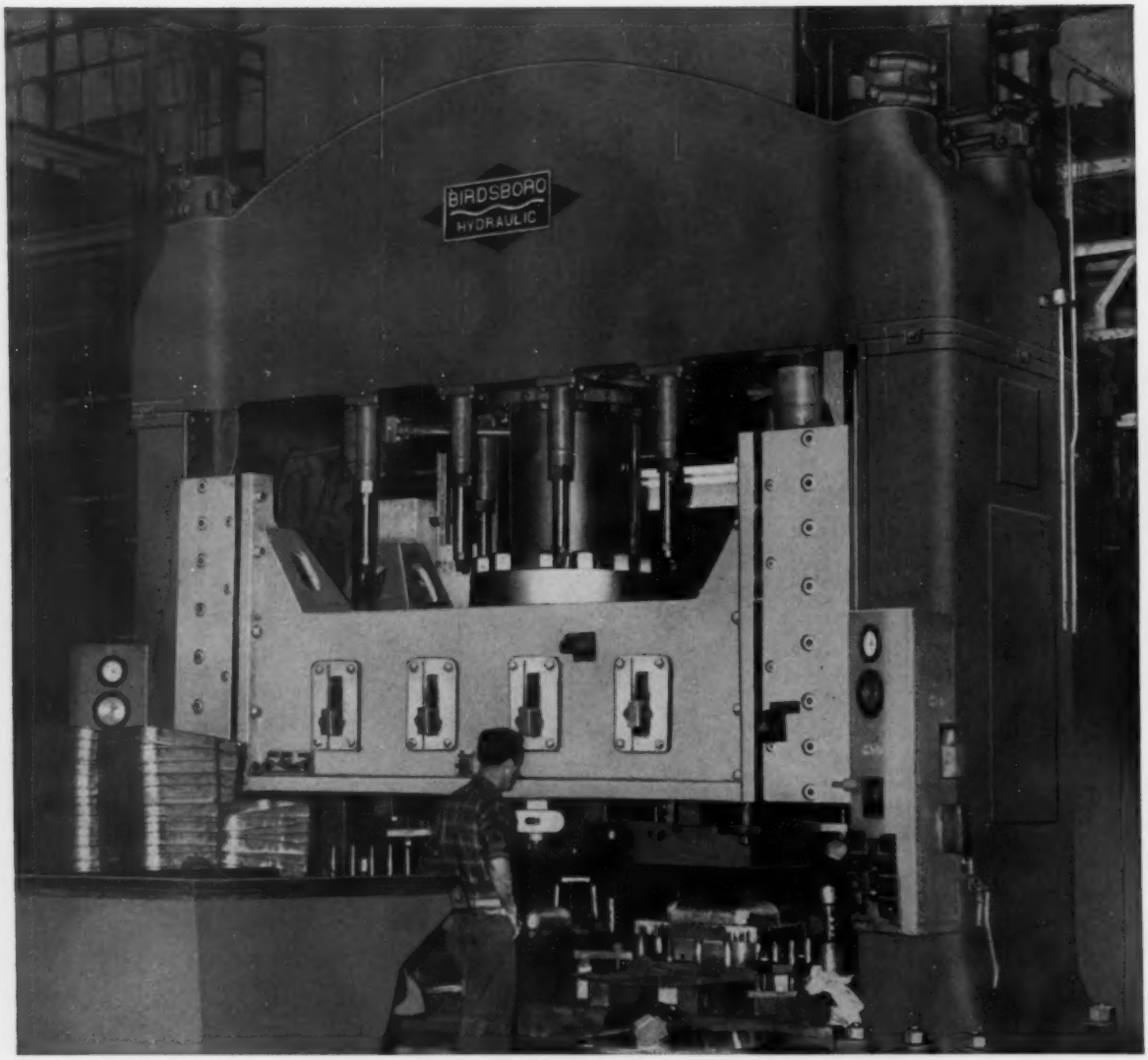
a division of

NATIONAL STEEL CORPORATION



Here's Hydraulic Press speed, flexibility and accuracy to help you protect profit margins in sheet metal fabrication

Designers and Builders of:

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Weldments "CAST-WELD" Design
ROLLS: Steel, Alloy Iron, Alloy Steel

• Through BIRSDBORO advanced engineering, large sheet metal stampings can now be turned out faster to close tolerances by this single action, deep draw Hydraulic Press. Design features allow quick changing of dies for more flexible operation.

The press is of the housing and shrunk tie rod type with hydro-pneumatic cushion of 180-ton capacity in the bed. The main ram capacity is 600 tons and the working area 144″ left to right, 60″ front to back, and 60″ daylight opening.

When you're thinking about more profitable operation, call BIRDSBORO in to check over your problems. We'll come up with the specific press recommendations to meet your requirements.

HP-25-56

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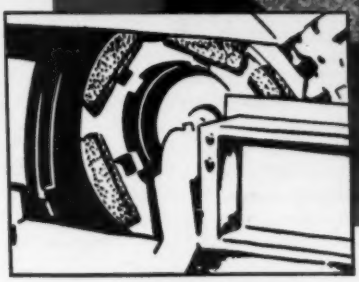
BIRDSBORO STEEL FOUNDRY & MACHINE CO., BIRDSBORO, PENNA. Offices in Birdsboro, Pa. and Pittsburgh, Pa.

Fast and Free Cutting for Surface Grinding

SIMONDS ABRASIVE CO.

ABRASIVE SEGMENTS



For substantial savings in surface grinding, use Simonds Abrasive Company Segments. Mechanically accurate in shape and size, they fit all segmental chucks, require no sulphuring, and grind more uniformly because of greater uniformity in grade and structure. Use them for gap type segmented wheels for fast, cool stock removal on large size pieces—and for solid type segmented wheels for small pieces chucked together. Write for bulletin ESA—188.

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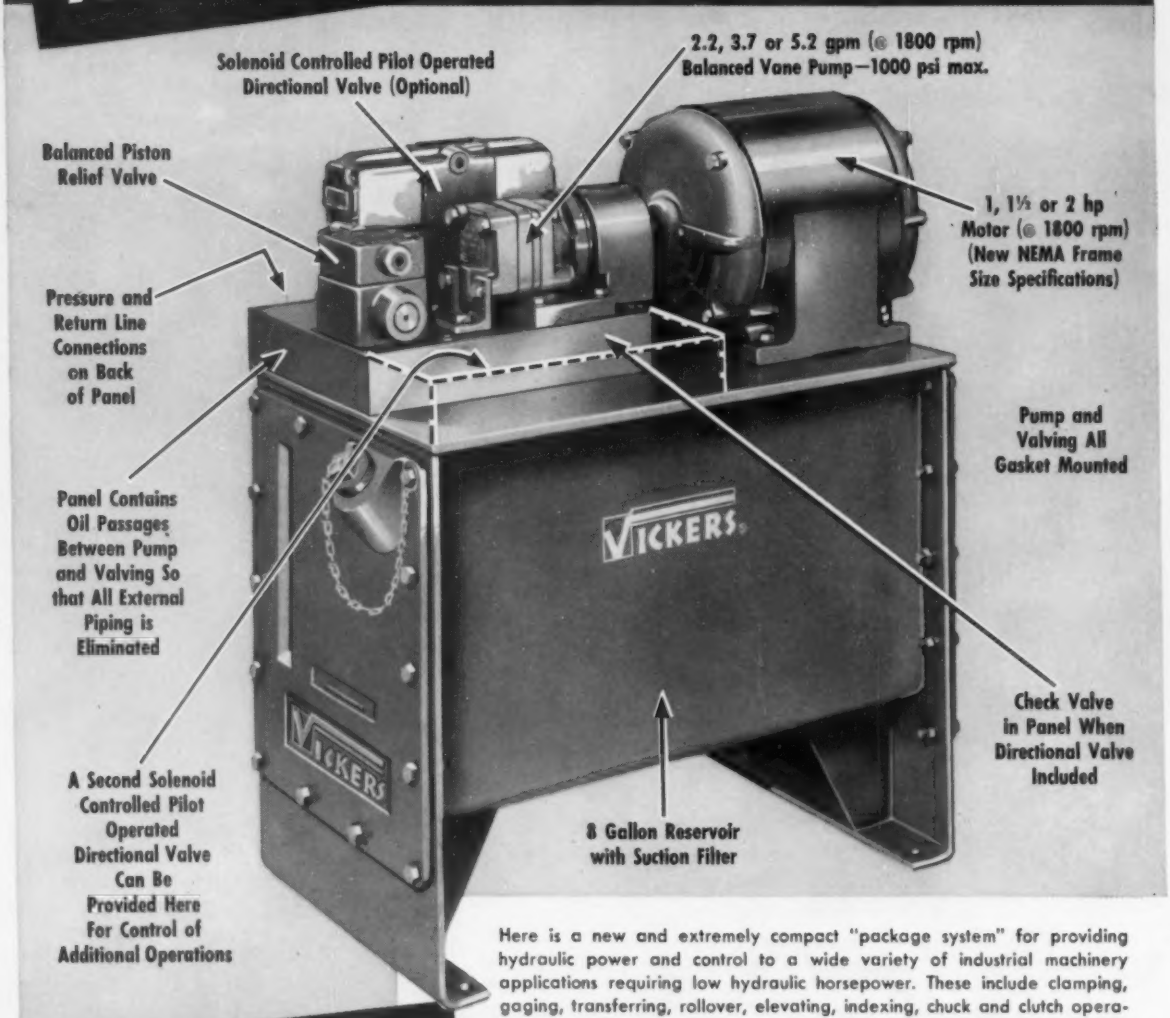
A NEW IDEA . . . in hydraulic power and control systems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2.2, 3.7 or 5.2 gpm (@ 1800 rpm) Balanced Vane Pump—1000 psi max.
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1, 1½ or 2 hp Motor (@ 1800 rpm) (New NEMA Frame Size Specifications)
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8 Gallon Reservoir with Suction Filter

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Series T8 HYDRAULIC PIPELESS POWER PACKAGE*

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Here is a new and extremely compact "package system" for providing hydraulic power and control to a wide variety of industrial machinery applications requiring low hydraulic horsepower. These include clamping, gaging, transferring, rollover, elevating, indexing, chuck and clutch operations, etc.

Note the many features indicated on the photograph above. The result is improved and simplified hydraulic design . . . also reduced installation and maintenance costs. This "package system" has great flexibility . . . is available in a wide variety of combinations of standard components assembled to suit individual requirements. Pretested and ready for immediate operation, it has also the advantage of undivided Vickers responsibility. For further information, ask for installation drawings 178706-8.

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*These "package systems" supplement the Vickers line of standard hydraulic power units.

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CUTS ALUMINUM AT SPEEDS UP TO 300 INCHES PER MINUTE

HELIARC cutting, a new process developed by LINDE, brings all the desired features of economical high-speed operations to the cutting of aluminum.

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★ **Straight lines, bevels, contours—no problem:** The new HELIARC cutting process can be used mechanically or manually. Both setups produce high-quality straight line cuts, bevels, circles, and shapes with revolutionary new speed and efficiency.

HELIARC cutting employs a high-temperature, high-velocity, constricted arc between a tungsten electrode and the piece to be cut. The concentrated, columnated energy of the arc stream melts and ejects a thin section of metal to form a kerf. The gas atmosphere (a combination of argon and hydrogen) prevents oxidation of the cut face.

Learn the details of how HELIARC cutting can help you increase production and cut operating costs. Call your LINDE Representative today.

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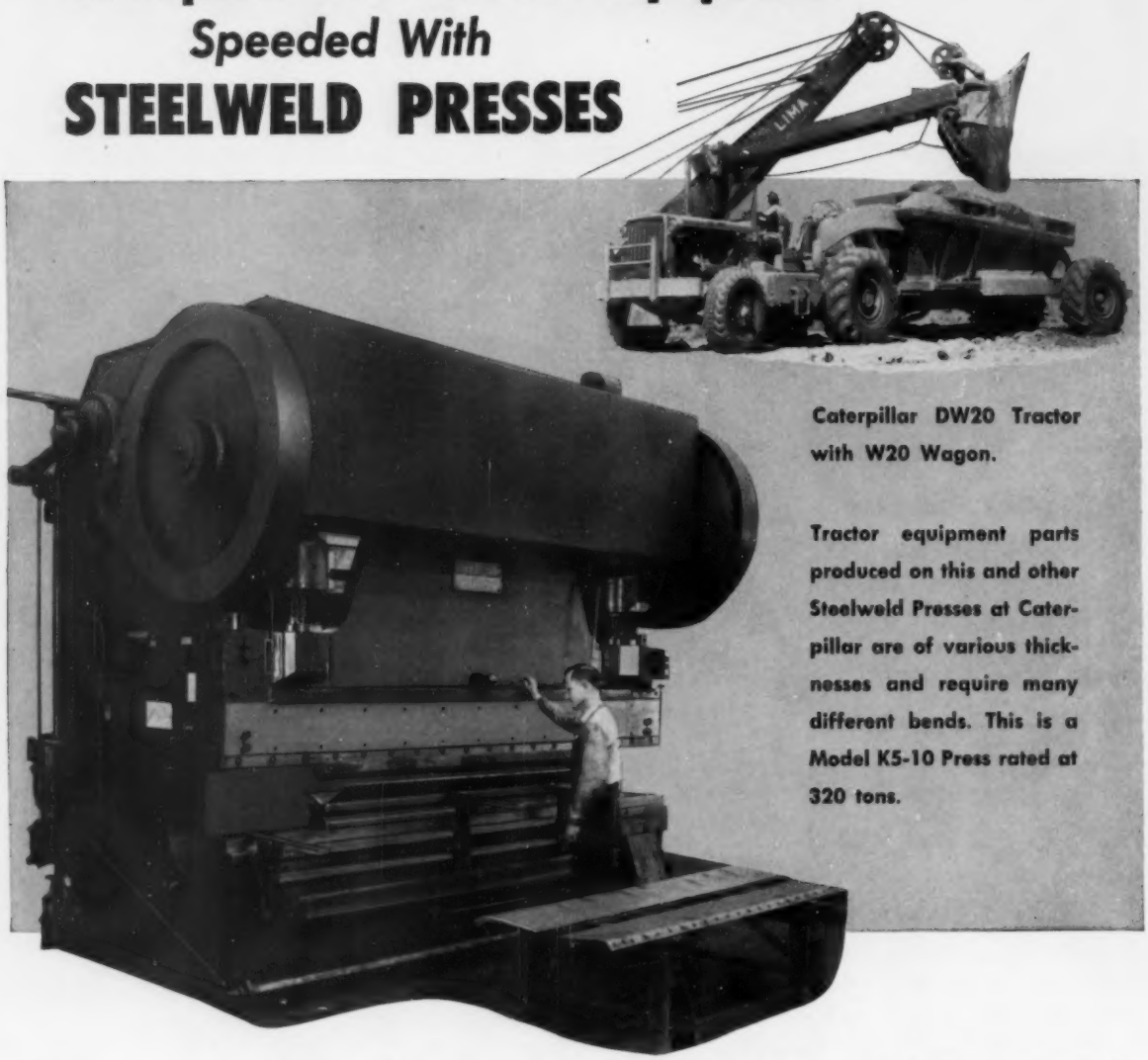
Caterpillar-Built Tractor Equipment
Speeded With
STEELWELD PRESSES



Caterpillar DW20 Tractor with W20 Wagon.

Tractor equipment parts produced on this and other Steelweld Presses at Caterpillar are of various thicknesses and require many different bends. This is a Model K5-10 Press rated at 320 tons.

THE ease and speed with which dies can be changed on Steelweld Presses and necessary adjustments made have proven a big asset in obtaining high production of a great variety of steel parts for scrapers, rippers, bulldozer blades and wagons at the Joliet Plant of Caterpillar Tractor Co.

Because of simplicity of Steelweld operation, the parts can be turned out quickly and accurately. The heavy quality construction, including solid one-piece frame, finest electrical equipment and automatic oilers for lubrication of all bearings, keep Steelweld Press maintenance extremely low and assure uninterrupted production.

GET THIS BOOK!

CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

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BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

always SOMETHING NEW in making butt weld pipe...

● Seldom will you see two butt weld pipe mills exactly alike. Each mill has individual ideas for the specific producer.

Many ideas originate with the pipe producer, who joins with Aetna in developing the equipment. Many ideas originate with Aetna and should... we design and build more butt weld pipe mills than any other manufacturer.

Here are two familiar examples — the Rotary Hot Saw and the Rotary Kick-out. Right now, Aetna's engineers have several ideas on the drawing boards for butt weld pipe. You will hear about them soon.

Whether your present pipe mill needs modernizing or replaced, Aetna-Standard is the manufacturer with the experience and the new ideas.

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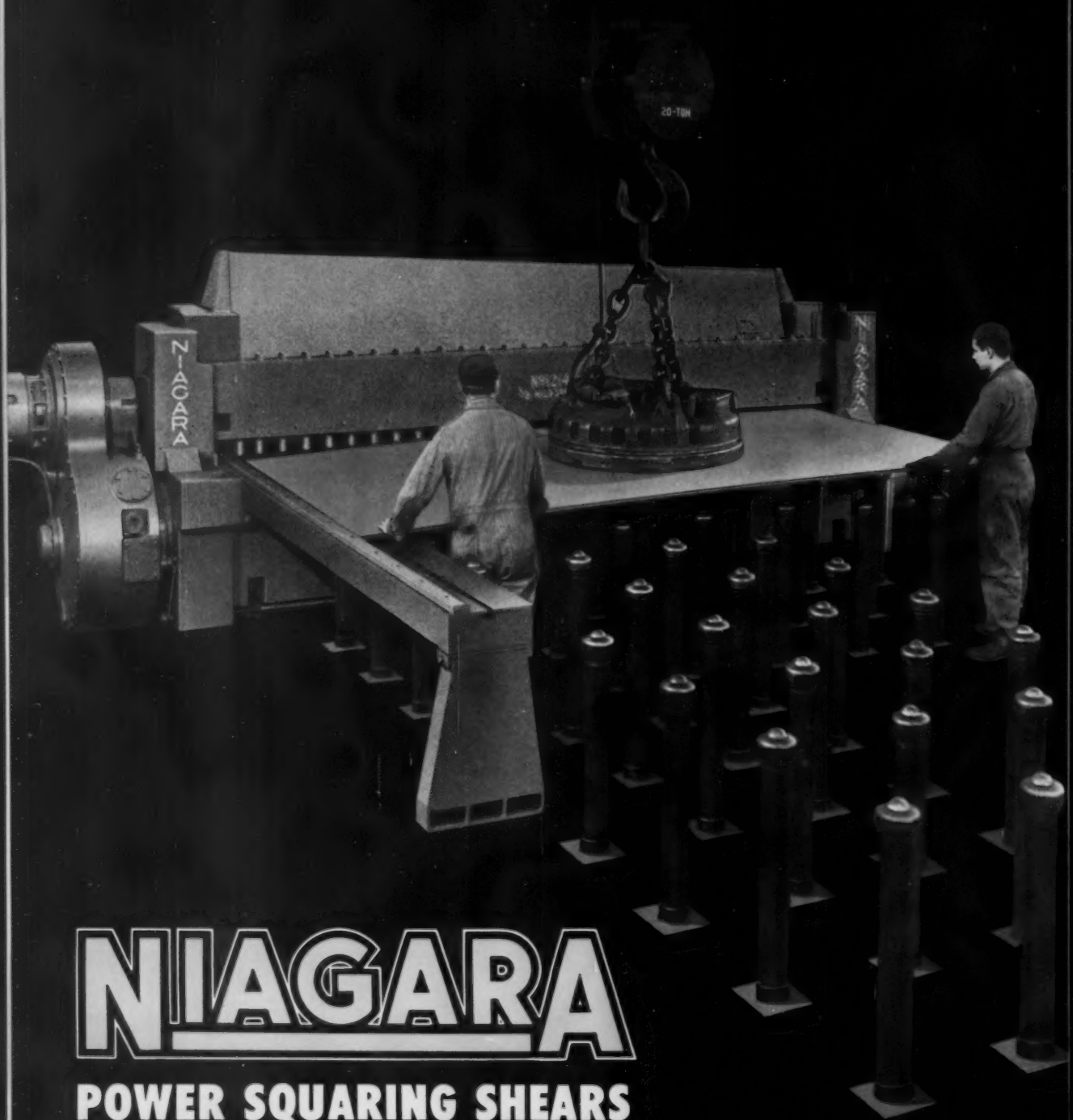
America's oldest shear builder

the most in accuracy, speed



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POWER SQUARING SHEARS

offers you

and thrifty performance

One of the greatest values of a Niagara Power Squaring Shear is the unequaled experience of its builder. Niagara has been making shears for more than 75 years . . . by far, the longest of anyone in the industry.

Today, as in the past, the oldest name in shears stands also for the most modern in shear design. Niagara has continually set the pace in offering the most of **things which count the most** in dependable shear performance.

YOU GET THE MOST IN ACCURACY:

- With the cutting line fully visible, the positive power actuated, self-compensating holddown grips work securely. Multiple pressure feet on 6" centers apply uniform pressure, contacting the work with low impact to safeguard material and bed against damage. Long or short work is held tight against the bed. There's no rippling of the sheet as the keen edged, low-sloped upper knife shears through . . . clean and smooth.
- Niagara's fully closed box section construction of bed, crosshead, holddown and housings plus ample and accurately held crosshead guides resist horizontal, vertical and torsional stresses with minimum deflection.
- Edges are trimmed straight and true within micrometer tolerances. Blanks, too, are cut accurately to size and shape without making compensating allowances when setting gages. Only a Niagara Shear possesses **all** of the necessary features to insure maximum accuracy!

YOU GET THE MOST IN SPEED:

- More working strokes delivered per minute and instant engagement of the Niagara Sleeve Clutch assure more cuts per hour. In continuous feed shearing, quick release of the power driven holddown enables a strip to be cut at each stroke.
- There's no need to adjust knife clearance every time a different thickness of stock is cut. Individual holddown feet are self-compensating. Two sheets of different thicknesses can be cut at the same time with the same knife adjustment and with the same accuracy.
- Ease of operation, quick setting gages and confidence inspired by safety features further increase hourly output . . . and make a Niagara Shear a truly productive, profitable investment for you!

YOU GET THE MOST IN THRIFTY PERFORMANCE:

- Simplicity of design, involving a minimum number of parts, cuts out costly maintenance. With less to go wrong, there's less to repair and replace.
- Vital parts of Niagara's driving mechanism (clutch, gearing, flywheel, eccentrics and detent) operate in enclosed oil-tight cases. Ideal lubrication and maximum safety are thus insured.
- With power transmitted from the drive through efficient spur gears and Niagara's instant engaging, multiple-point sleeve clutch, there are no sliding surfaces (such as in worm gears and friction clutches) to consume power, generate heat and wear rapidly.
- Niagara A-cutting-edge knives, manufactured entirely within the Niagara plant, are uniformly tough to withstand hard usage and are promptly available.

Niagara Shears at work in [illegible] of the major electrical appliance manufacturers.

MOST EXACTLY SUITED TO YOUR NEEDS, TOO!

To fit your requirements exactly, consult a Niagara representative. With over 7 dozen models available in capacities from shim stock to 1" mild steel and in cutting lengths from 3 to 24 ft., he'll be able to recommend the shear that's **right** for you.

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It will give you detailed information on the complete, modern line of Niagara Underdrive Squaring Shears. Write for your copy today.

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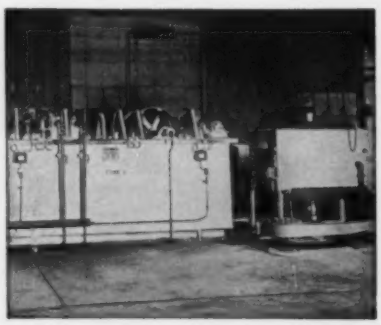
TITANIUM STRIP is descaled continuously on time cycles as low as 30 seconds, with excellent results.

10-MINUTE IMMERSION loosens scale on 5 tons of stainless wire. A water quench, 3-minute acid dip, and final water rinse produce a clean, bright surface with no pitting or etching.



LIGHT-GAUGE ALLOY STRIP is descaled at 20-35 ft. per min. in this Virgo bath, after annealing.

Use this fast, safe Hooker Process for descaling steel and titanium

Descale alloy steels and titanium in any form—rapidly, safely—using the Hooker Process with Virgo® Descaling Salt.

A bath of molten Virgo Descaling Salt quickly converts scale, rust, and other surface impurities to an acid-soluble coating. A quench, acid dip, and final spraying then remove this coating in from one-tenth to one-hundredth the usual pickling time, with no measurable effect on the base metal.

You can easily set up the Hooker Process for batch or continuous operation on any form of work including strip, sheets, bars, wire, tubes, plate, castings, forgings, and fabricated parts. You can usually process work as fast as your handling methods allow, with a minimum of supervision. Operation is safe for personnel, and there is little or no spent-acid disposal problem.

You can profit by the experience of more than 50 companies now using the Hooker Process successfully to speed up descaling of alloy steels and titanium in practically every form.

You'll get quick service on any descaling problem, by writing or phoning us. Complete test and engineering facilities are at your disposal, without obligation.

Send for these bulletins—Get the whole story on Virgo Descaling Salt for alloy steels and titanium . . . how the Hooker Process works, its advantages, how to set up a Virgo descaling line, and the services you enjoy as a user. No obligation. Write us today.

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HOOKER ELECTROCHEMICAL COMPANY

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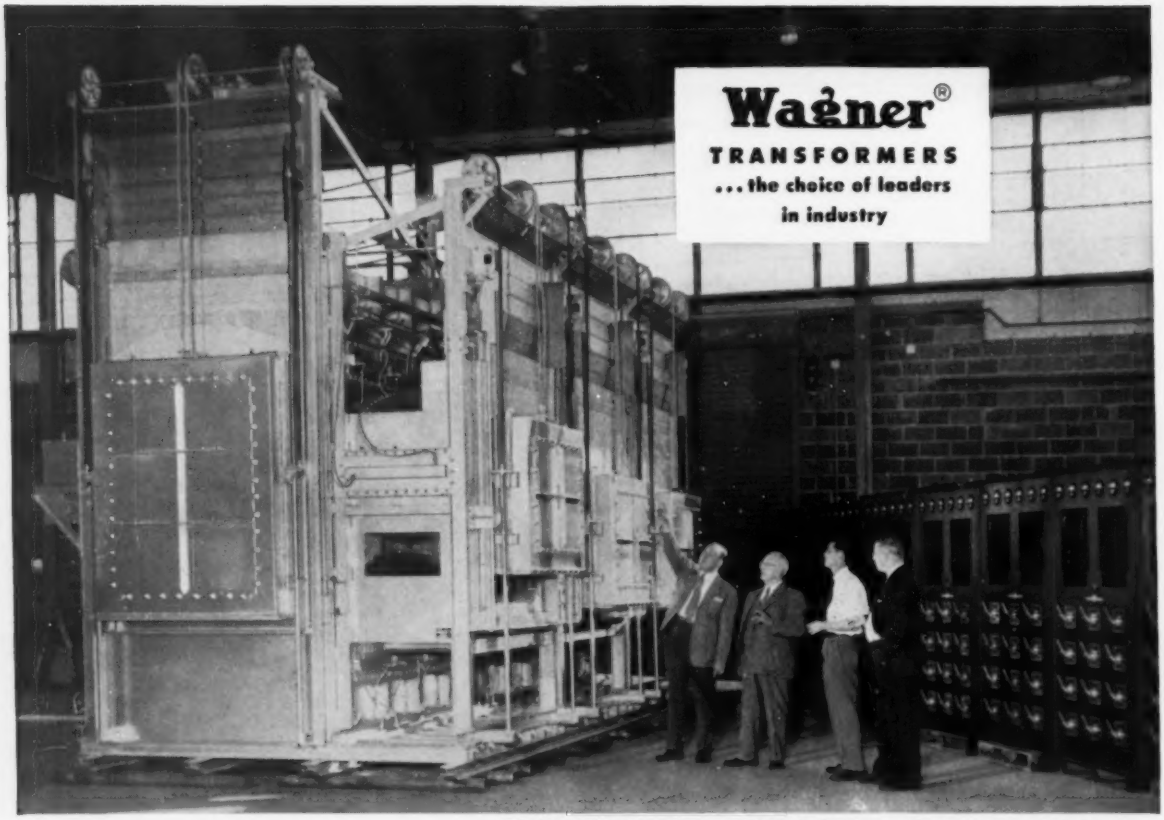
Here's *usable beauty* for exacting service . . . wear-resistant, hard, bright and strong throughout! SUPERIOR STAINLESS forms smoothly and easily because it is uniform in every physical quality: facts proved by the mile in mouldings manufacture every day. • May we serve *your* stainless steel strip applications?

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA



This 55-ton high-temperature, controlled electric steel forging furnace, built by C. I. Hayes, Inc., gets its power supply through Wagner Dry-Type transformers.

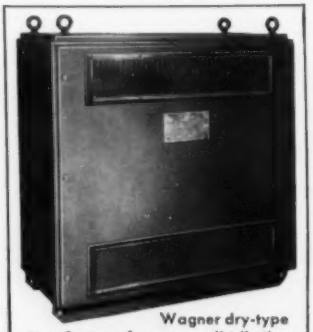
Wagner Dry-Type Transformers supply power for the world's largest electric steel forging furnace

In North Grafton, Massachusetts, the Wyman-Gordon Company has placed in service the largest electric steel heating forging furnace ever built anywhere. It has a capacity of 10 tons of steel billets.

The plant, largest single unit in the USAF heavy press program, makes plane components of unprecedented strength, lightness and dimension on 50,000-ton, 35,000-ton and other hydraulic closed die forging presses.

Operating temperatures as high as 2400 degrees Fahrenheit may be maintained with a connected load of 600 kilowatts, supplied to the furnace through eight Wagner Dry-Type transformers.

Wagner Dry-Type transformers were selected for this job because they supply dependable power right at the load. You can spot them *close* to your loads and save money in terms of shorter runs of copper, reduced line losses, and lower installation expenses.



Wagner dry-type transformers for power distribution are available in single-phase, 1 through 500 kva; and three-phase, 3 through 2000 kva ratings. Write for Bulletin TU-57 or consult the nearest of our 32 branch offices.

Wagner Electric Corporation
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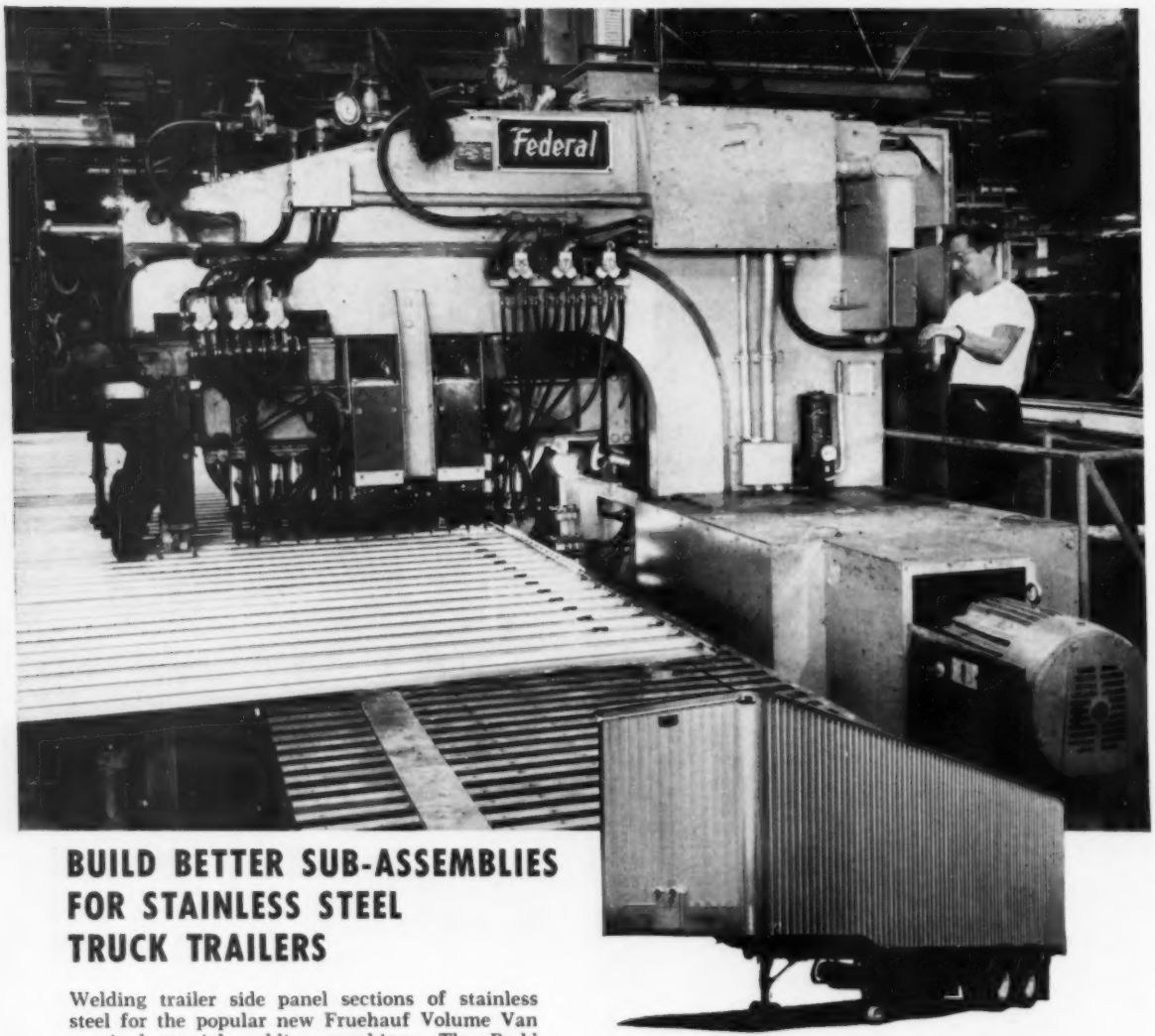
How Federal Helps Budd...



BUILD BETTER SUB-ASSEMBLIES FOR STAINLESS STEEL TRUCK TRAILERS

Welding trailer side panel sections of stainless steel for the popular new Fruehauf Volume Van required special welding machines. The Budd Company, one of the nation's largest manufacturers of transportation equipment, naturally, turned first to Federal.

Federal, in cooperation with Budd, designed and built an ingenious "C" frame multi-spot traveling welder that turned the difficult job of welding side frame panels and structural skirt sections into a high production operation.

Self-propelled on 120 feet of rail, the machine travels over the work which is laid horizontally on a copper shunt die back-up fixture. It features an adjustable slow speed for indexing with a rapid traverse for return. Two rows of tandem piston, double-acting air guns are indexed at right angles to the line of welder travel to permit close spot welding. The machine automatically positions itself and selects gun sequence. Operator, riding with the machine, always has clear view of work, ready access to controls.

Stainless steel sub-assemblies for the Fruehauf Volume Van (above) are fabricated by the Budd Company for Fruehauf.

If your operation calls for special resistance welding — you, like leading manufacturers, should call on *Federal — First in Resistance Welding.*

WELDING SHOW

Booth No. 73

THE FEDERAL MACHINE AND WELDER COMPANY

WARREN, OHIO

Federal WELDERS®

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NEWSFRONT

How Goes Standardization?

Military's standardization program is picking up steam. Since 1952, Defense Dept. reports, more than 3000 items have been eliminated from supply systems, while 1129 specifications have been reduced to 476. Standards for fast-wearing internal combustion engine parts—pistons, rings, valves, etc.—have been cut from 2872 to 204. Program is being stepped up to cover additional items.

Rail Freight Rulings Due

ICC has two big freight investigations under way. One involves railroads' right to offer special low rates in the official territory on sheets and other steel products that can be hauled by trucks. Other concerns rail rates to the Southwest on pipe. Issue here is whether railroads can set rates that are competitive with barge lines. Ruling is expected sometime this summer, but long arguments loom in both cases.

Healthly Materials Handling Outlook

Materials handling-equipment builders are feeling buoyant. One of the largest makers of industrial fork lift trucks expects 20 pct better sales this year than in '55, when a record was set. The same source's prediction for the entire lift truck industry: A 50 pct increase in next five years.

Is Auto Competition Easing?

The sales slugfest in the auto industry seems to be slowing down. Ford-GM competition continues red hot. Still, two GM moves in recent weeks appear highly significant; the change to more conciliatory dealer franchises, and the decision to participate in an all-industry show in New York. Motorama's fate is undecided.

Simpler Check On Carbon Content

Tough as it is to make extra-low carbon stainless, it's even tougher to accurately check its carbon content. A new analytical technique is reported by Japanese researchers to be simpler, faster, more accurate. It's based on the pressure measurement of CO_2 held by liquid nitrogen and vaporized in a constant volume; guarantees accuracy of 0.001 pct for carbon content less than 0.08 pct.

Appliance Inventories: No Problem

Discount stories of mounting appliance inventories in warehouses. It's customary to stock on refrigerators, freezers, air conditioners in the spring for a summer selling peak. Actually, January and February sales of summer selling items have been unseasonably high, including even some air-conditioner lines. Appliance sellers generally confirm earlier IRON AGE forecasts of another strong appliance year exceeding 1955's high levels.

Atom Fleet A-Building

Navy's plans for a fleet of atom-powered surface craft, still in embryonic stage, are moving right along. First ship, slated for operation in 1960: an 11,000-ton guided-missile-launching cruiser. The following year an atom-driven carrier larger than the 70,000-ton Forrestal goes down the ways. They'll bring to 17 the nuclear-powered vessels planned or built by the Navy.

Tighter Welding-Cycle Control

Coupling electronic control equipment with improved resistance welding machines permits regulating weld-cycle intervals within 1/60 second. Accuracy of the timer control is tied to the rhythmic beat of time signals from U. S. Naval Observatory near Washington. Better cycle control will help welders meet more rigid specifications.

Taconite Is Moving Out

Taconite gets off the ground this year. Initial full-production shipments are being made from Minnesota's 1-million ton stockpile; almost 5-million tons will be shipped by all producers. Eight of 10 largest U. S. steel companies are in the field, with investments totalling well over $500-million. At last count there were seven U. S., Canadian plants in or near production within a year.

Farval provides foolproof lubrication for 50-spindle drilling machine

FARVAL—
Studies in Centralized Lubrication
No. 181

GOOD lubrication plays a vital part in the success of any drilling machine. It boosts output, cuts costs and extends machine life.

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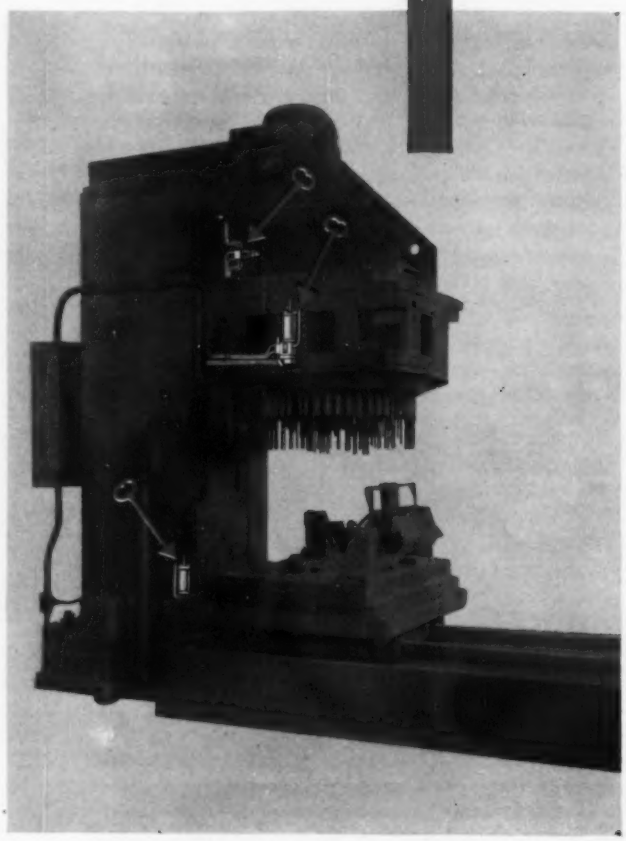
FARVAL
CENTRALIZED SYSTEMS OF LUBRICATION



KEYS TO ADEQUATE LUBRICATION—Wherever you see the Farval valve manifolds, dual lubricant lines and central pumping station, you know a machine is being properly lubricated.

This *Farvalized* special vertical drilling machine, built by Barnes for a Midwestern aircraft engine manufacturer, is a saddle-type unit, arranged with a 50-spindle adjustable center auxiliary head with slip-type spindle construction.

What's Happening Along the Ohio?

Once placid river valley stirs with new industry . . . Power and transportation are big attractions . . . Long a home for basic industry, diversification stimulates area—By G. J. McManus.

◆ THE OHIO VALLEY is a loosely-defined area stretching 981 miles from the apex of Pittsburgh's "Golden Triangle" to Cairo, Ill. In its rolling course southwestward, the Ohio River washes the borders of six states —Pennsylvania, Ohio, West Virginia, Kentucky, Indiana, and Illinois.

With its rich deposits of coal, and "The River" to carry raw materials and finished products, the Valley is a natural for industry. Steel has been settled there for years. And so have other more or less basic industries. But its industrial growth was relatively slow. That is, until recently.

Today, the Valley is being called "America's newest industrial frontier." Almost overnight, industry appears to have discovered the Valley and its many advantages from the standpoint of transport, manpower, proximity to markets, and natural resources. Metalproducing and metalworking are in the vanguard.

Spent $10 Billion

It's estimated that since World War II, industry has poured approximately $10 billion into the Valley for new plants and expansion. Aluminum, hungry for electric power and taken by the Valley's immense reserves of coal, is one of the biggest contributors to the boom. Steel, appliances, automotive, aircraft, ferroalloys, chemicals, atomic energy, and machine tools are locating new plants or spreading their wings at existing installations.

In the last five years, $5.6 billion has gone into new Valley plants, nearly $2 billion into expanded facilities. Last year, about $750 million was spent for expansion on the Ohio.

As more industry settles in the Valley, the boom triggers a chain reaction that compels additional companies to move in to supply the materials and components needed by the early settlers. It adds up to big new markets for metalworking and other industries.

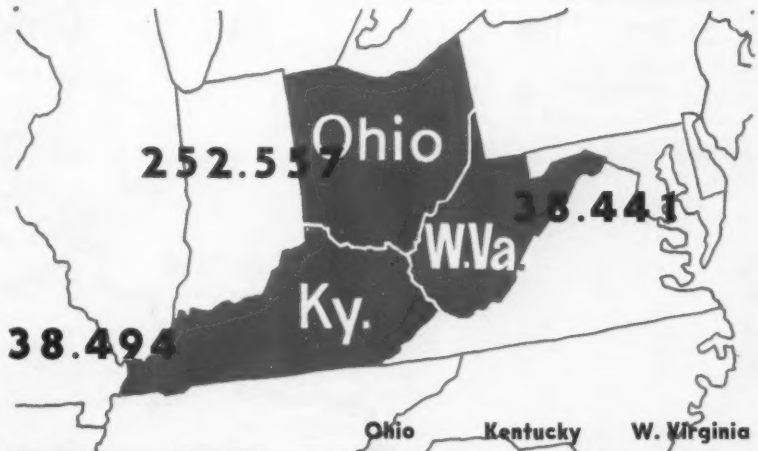
Here's Why

Some of the reasons why industry is gravitating to the Valley were pointed up by D. A. Rhoades, vice president and general manager of Kaiser Aluminum & Chemical Corp., in announcing plans to construct a 220,000-ton aluminum reduction plant at Ravenswood, W. Va.:

"The Ravenswood reduction plant . . . will be connected by economic water transportation with our alumina plants and our Jamaica bauxite mines . . . Overall freight savings will be substantial, and will result in a highly favorable combination of transportation and power costs . . . within a 500-mile radius of

Ohio Valley Metalworkers

(Number of Workers)



	Ohio	Kentucky	W. Virginia
Primary Metals	35,789	7,222	19,509
Metal Products	34,747	11,278	7,400
Machinery	87,044	5,270	3,587
Electrical Machinery	28,931	10,549	2,580
Transportation Equipment	54,815	1,932	2,027

more than 70 pct of the nation's aluminum usage . . . assurance of an adequate long-range supply of economical power derived from coal."

Aluminum Co. of America is combing the Valley for a plant site, recently described as "premature" reports that it will build a new smelting plant near Evansville, Ind. Alcoa is looking elsewhere, too, but the Valley appears to be coming in for the closest scrutiny.

Gets Promotion

Olin Mathieson Chemical Corp. is investing $120 million in aluminum reduction and rolling facilities near Clarington, O. It will be Olin Mathieson's first venture into aluminum. An "almost unlimited supply of economical electric power" was the chief attraction of the area.

Reynolds Metals Co., another aluminum producer, owns land and mineral rights to 25,000 acres in Kentucky, apparently has something in mind for later development. In fact, Reynolds bought the site with a view to building a primary aluminum plant of 135,000-ton capacity, but more pressing commitments forced the company to shelve the project.

Valley chambers of commerce and other civic groups are promoting the boom for all they're worth. Scores of special surveys covering plant sites, power supply, manpower and other essentials, are available for the asking. Some of this promotion was long overdue. West Virginia, for example, took a long hard look at itself through a study by an independent research organization and discovered that its young men and women were forced to leave the state due to lack of employment opportunities.

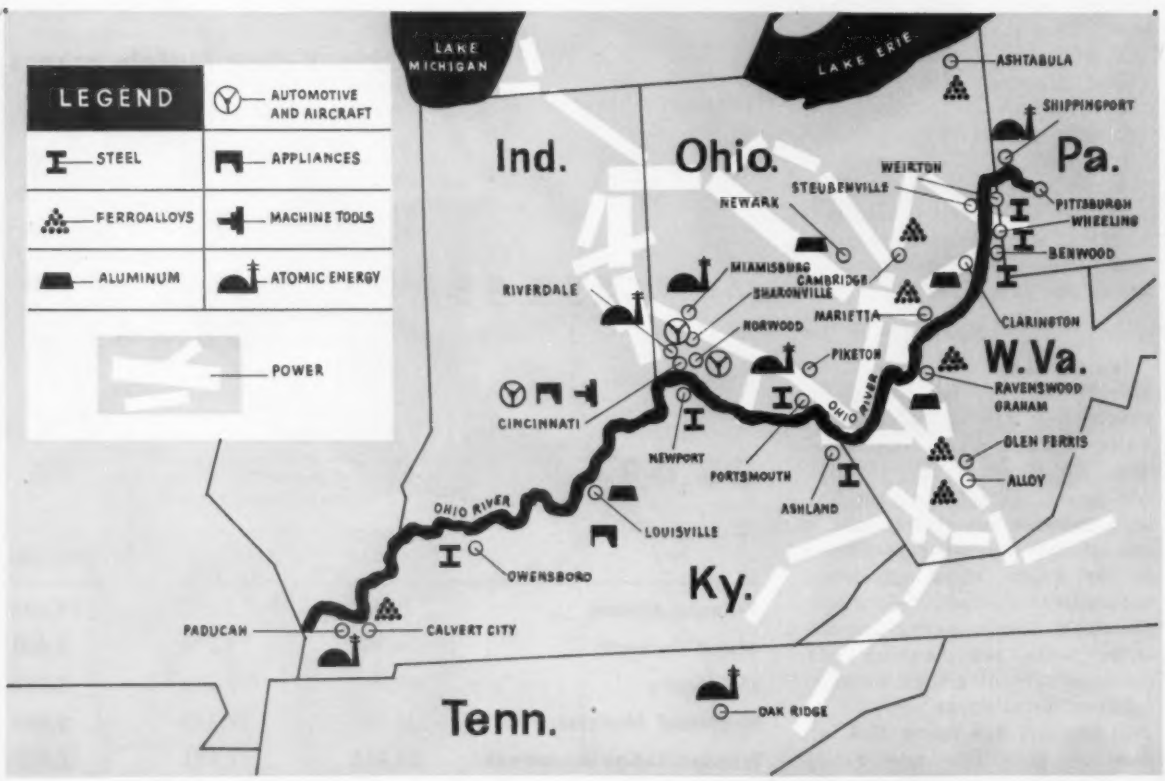
In all of these studies, "The River" and coal are the principal come-ons to industry. The Ohio offers a 9-ft channel all the way to Cairo, where it connects with the Mississippi and through it, with inland waterways, into Texas. In 1954, over 55 million tons of materials flowed through the Valley.

Deeper Channel Sought

A plan is underway now for larger river locks and controlling depth of 12 ft for the Ohio. At the same time, danger of floods, once a blight on the Valley, has been diminished through a network of flood control dams. The program calls for 77 flood-control reservoirs, 33 of which have been completed.

Meanwhile, one-third of all the coal produced in the U. S. comes from within 150 miles of Huntington, W. Va., including the bulk of metallurgical grade coal. American Gas and Electric, which has nine Valley plants in a 3,148,000 kw capacity system, relies almost entirely on coal as a source of power.

Where Industry Settled in Ohio Valley



LOADING steel for distant market.

Eight atomic energy projects are strung along the Valley from Kyger Creek, O., to Paducah, Ky. General Electric moved into Louisville in 1952 with its $45 million Appliance Park. Ford Motor Co. came to Louisville the next year with a $60 million truck and automotive plant.

Effect of this and other new construction shows up in the business of companies that sell to the Valley. Newport Steel Corp. in Newport, Ky., has seen Valley consumers boost their share of the mill's output from 45 pct in 1946 to 65 pct today. A welding supplier estimates that Cincinnati sales jumped 6 pct in 1954 and 9 pct last year.

Power Attracts

In addition to aluminum, other power-hungry industries started some time ago to build heavily in the Ohio Valley. One big cluster centers on the Kanawha River in West Virginia and on the Ohio near its junction with the Kanawha. Union Carbide and Carbon's Electro Metallurgical Div. began operations at Glen Ferris, W. Va., in 1910. The company has plants in Alloy, W. Va.; at Marietta and Ashtabula, O.; and a new silicone plant at Long Reach, W. Va.

Vanadium Corp. went into the Valley in 1951 with an $8 million alloy plant at Graham, W. Va. Vanadium added a plant at Cambridge, O., in 1952; poured another $4 million into the Graham works in 1953; has another plant coming now at an upper Valley site.

Another booming center of power-consuming industries is Calvert City, Ky., where TVA current is available. Since 1948, more than $67 million has gone into Calvert City facilities. Air Reduction Co. has spent $21 million on carbide and acetylene facilities there. Pittsburgh Metallurgical has a $13 million stake in ferroalloy production. Pennsylvania Salt, B. F. Goodrich, and General Analine are strongly represented.

Labor Plentiful

Labor supply along the Ohio River is generally good. Kentucky and West Virginia attribute declining populations to a lack of enough jobs. Kentucky in 1954 had 170,600 unused or under-used workers. Both states are pushing hard for new industry. The aggressiveness of development groups in these states and throughout the rest of the Valley is one more reason why the area is growing.

This enthusiasm, plus an abundance of level country, has paid off in industrial investments for Kentucky totaling $1.5 billion since 1948.

Nearby Cincinnati is likewise booming. Last year $62 million went into new or improved industrial facilities there. Ford has a 6000-man transmission plant going up in Sharonville. General Electric, General Motors, Cincinnati Milling, Alvey-Furgurson, are just a few of the others who are working and growing around Cincinnati.

In the upper Valley, steel production is booming. Weirton Steel, with four plants at Weirton and one at Steubenville, has added about 1 million tons of ingot capacity since 1946. Current $65 million expansion at Wheeling Steel will bring total postwar capital expenditures to $235 million.

Detroit Steel's Portsmouth Div., in the central Ohio Valley, has a $60 million improvement project behind it. Newport Steel, Armco and others have been modernizing and expanding steadily.

But in the upper Ohio and the Kanawha Valley areas, general industry has not kept pace with basic metal production. In the six Ohio and two West Virginia counties between the Pennsylvania border and Wheeling, steel employment outnumbers other manufacturing two to one.

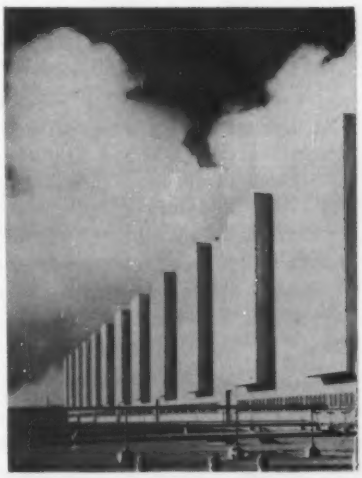
A similar situation troubles West Virginia. Employment is concentrated in coal mining, chemicals, primary metals, and stone clay and glass products. General industry has lagged, showing a total (in 1953) of less than 20,000 in fabricated metals and machinery production.

Need Balance

Both areas—the upper Valley and West Virginia—are pushing hard for better industrial balance. They have had detailed studies made of their resources and problems. They feel the recent aluminum moves may stimulate related activity. They are sprucing up communities, improving services, working with companies on special needs.

Atomic power is a big thing in the Ohio River Valley. There are eight Atomic Energy Commission plants within a 275-mile radius of Cincinnati. Oldest is the initial AEC installation at Oak Ridge, Tenn.

Newest are two private steam-electric generating plants. One of these is operated by the Indiana-Kentucky Electric Corp.; the other is operated jointly by 15 electric companies at Kyger Creek.



ATOMIC energy plant at Paducah.

RESEARCH

ATOMIC ENERGY: Government Grip Slips

Apparently reluctant AEC makes some progress in letting industry in on secrets . . . Recent actions help out . . . Congress shows signs of needling AEC . . . Relaxed rules for industry summarized—By G. F. Sullivan.

◆ A GROWING LIST of industrialists and congressmen are determined to break loose from the Atomic Energy Commission information vital to private industrial development of nuclear energy.

In general, AEC takes the stubborn position that it will decide what industry shall know about nuclear fission and what all the industrial applications will be. This attitude, says Sen. Clinton P. Anderson, sounds like "thought control" to him. Many industrialists interested in private development of nuclear power feel the same way.

But AEC actions during the past few months show that some progress is being made in letting industry learn more about what government is doing and in exchanging atomic information within industry.

Even data on once hush-hush efforts to control the fusion (H-bomb) reaction are now available to more than 600 companies holding AEC access permits. More important to industry, patent regulations have been liberalized and licensing requirements for fuel element fabricators dropped.

Ten Power Reactors

At present there are ten private power reactors planned for the U. S. and seven more proposed. The latest and largest, proposed for Florida, would be rated at "up to 200,000 kw"—big enough for a city of 250,000.

Meanwhile, better equipment and broadening experience has boosted the estimated savings which industry is making through radioisotopes. The figure is now set at a $200 to $300 million annual saving, with predictions that it will hit $1 billion in 10 years.

Here are three recent AEC actions (with effective dates) which make it easier for an industrialist to work with atomic energy: (1) New access permit regulation (Feb. 4); (2) reactor licensing (Feb. 18); and (3) new rules on handling secret data (Feb. 2).

In setting rules on access permits, the AEC has come a long way from its once secret stand on thermonuclear energy discussion, now includes it in information categories available to access permit holders. Significance here is more in the liberalization than in the actual information available. Also, the Commission no longer insists that it get royalty free nonexclusive licenses to inventions based on access to restricted data.

Less Individual Control

On safeguarding restricted data, new rules lower some of the barriers that once prevailed. Formerly it required AEC approval for a cleared man in one company to talk atomically to a cleared man in another. This meant duplication of effort because it was usually too much trouble to check everything through Washington. Now, within the categories covered by their access permits, such interchange of nuclear views and data is legal.

The end of licensing for fuel element fabricators should help in an area that is now a major cost barrier to economical power. Until recently, plants fabricating nuclear fuels had to be licensed. This has been dropped; three companies that had applied for such licenses were recently given construction permits instead. They are Babcock & Wilcox, Metals & Controls Corp., and Cook Electric Co.

For details on new AEC rules:

Rules and regulations of the AEC that have been codified appear in the **Code of Federal Regulations** under Title 10—Atomic Energy. This document, and yearly supplements, may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. The **Federal Register** is available on a subscription basis from the same source. Copies of individual rules, regulations, etc., published in the **Federal Register** may be obtained in press release or reprint form from U. S. Atomic Energy Commission, Division of Civilian Application, Washington 25, D. C.

Three other actions make it easier to know just what the rules are: (1) Licensing of people who control reactors (Feb. 3); (2) AEC rules of practice (March 5); and (3) regulation of plutonium, uranium 233, etc. (March 4).

In this area the major step was publication of "AEC Rules of Practice."

Since there are about 30 reactors now in use or under contract to be built for private industry in the U. S., the AEC wants to be sure all are or will be safely operated. Hence a new regulation requiring "Operators' Licenses" for anyone who controls a private reactor. This means an operating test on that type reactor, a written examination and a medical exam.

STOCKPILE: Just Over Half Full

Government hoard of strategic materials fills up drop by drop . . . Minimum goal is nearly filled . . . ODM admits it plans dispersal of some materials . . . Picture varies by category—By *N. R. Regeimbal.*

◆ GOVERNMENT'S stockpile of strategic and critical materials is filling up, but at a snail's pace. Rate of deliveries of metals and other materials to the hoard is now running at a rate only a little better than 2 pct a year.

In the six months ending Dec. 31, some $167 million worth of materials (about 600,000 tons) was delivered to the stockpile. But the total value of goods on hand rose by $610 million, with most of the remaining $443 million increase due to inflation—price increases in the civilian wholesale markets, which increased the value of the stockpile but not the tonnage.

Two Classifications

Stockpile is classified two ways: (1) Minimum needs for an emergency, and (2) long-range needs, which include purchases to bolster sagging defense or mining industries.

Total stockpile goal is $11.2 billion, $6.9 billion in minimum needs and $4.3 billion for the long range program.

Deliveries plus inflation in the last six months bring the total value of goods on hand to $6.3 billion, $5.2 billion in the minimum stockpile and $1.1 billion in the long range category.

Office of Defense Mobilization, which administers the stockpile program, has closed 38 of the original minimum stockpile goals, and 8 of the 16 original long-term goals.

Some Filled

Among goals in the minimum stockpile which have been filled, and for which the government is no longer in the market, are crude aluminum oxide abrasives, aluminum, asbestos, metalgrade bauxite, cadmium, columbite, industrial diamonds, graphite, lead, metallurgical grade manganese ore, some mica, tantalite, tin, tungsten, vanadium, and zinc.

Crude aluminum oxide abrasives, asbestos, graphite, tantalite and vanadium are also among the long term stockpile goals which are filled. Some goals, including lead and zinc, are filled in the minimum stockpile program, but are still open in the long term program.

Dispersal Started

Purchases for the minimum stockpile in the last six months of 1955 totaled $90 million, consisting mostly of cobalt, nickel, metallurgical grade chromite, and copper. Purchases for the long-term goal, amounting to $77 million, were mainly tin, aluminum, tungsten, metallurgical manganese, lead and zinc.

ODM, in summing up its stockpile objectives in the past six months, confirms that steps are being taken to disperse some of its hoards, which are now stored in 259 locations. Dispersal of ores and metals is relatively unimportant, because they are generally more secure than the industries which use them. The government would rather have them as close as possible to centers of use—thus in effect also stockpiling transportation and manpower.

What Else?

ODM has said nothing, recently, in answer to industry queries on the possibility of the government dropping out of some currently tight markets. However, with tin on the minimum objective list and the future of the Texas City smelter in doubt, there seems to be a good chance that this almost entirely foreign-produced-and-smelted metal will be dropped, possibly by the end of 1956 or beginning of 1957.

What's in the Government Stockpile?

- **Value of stockpile of strategic materials amounts to $6.3 billion toward a goal of $11.2 billion. Buildup now runs at 2 pct per year.**
- **Aluminum—Objective reduced. Buying stopped because of industry expansion projects.**
- **Copper—One of principal items being purchased. Government diverted 9000 tons of planned purchases to industry, sold another 6200 tons from DPA inventory to help ease civilian shortage.**
- **Nickel—Government buying in large amounts. In last six months of 1955, ODM diverted 17 million lb to ease the pinch on industry. Government and industry are expanding production. Pilot plant to produce metal from Cuban ores is in operation.**
- **Titanium—Government reducing forced-draft sponge program because of slack demand. But steps up research to expand use by cutting costs and improving processes.**
- **Lead and Zinc—ODM is committed to buy excess production in order to keep the industry operating.**

BUSINESS

FORECASTING: A Defense Cycle Rebuttal

Eliot Janeway's Defense Cycle theory challenged . . . Basing business predictions solely on defense factor called superficial . . . But it is agreed that business cycle forecasting is out of date—*By Theodore Levitt.*

◆ THE SECRET that Eliot Janeway has discovered is not the secret of the so-called Defense Cycle. Rather it is this: that businessmen are greatly influenced by any aggressive, unambiguous, unequivocal, no-nonsense, authoritative assertion.

The reasons this is a great discovery are that:

1. Businessmen are weary of the faltering, ifs, ands, and buts characterizing the work of so many economists.

2. Businessmen are sufficiently uneasy about the adequacy of their own crystal ball, rule of thumb predictive jabs and thrusts to be fairly receptive to somebody who makes a vigorous and confident assertion about the future.

3. Everybody likes to hear unqualified good news, especially when things look bad, and Mr. Janeway has come up with a whole crock full of edifying felicities.

Aside from the fact that he grossly misrepresents what any self-respecting economist would agree is modern business cycle theory and how it may be usefully employed in economic forecasting, how well is Mr. Janeway's theory documented?

The Author

At 31, Theodore Levitt is a consulting economist to Standard Oil Co. (Indiana). He holds a Ph.D. in economics from Ohio State University, formerly taught at Univ. of N. Dakota and Ohio State. A Chicagoan, Mr. Levitt is partner in a business consulting service with offices in several cities.

Marshall Plan Argued

For example, what about the 1949 recession? It came right at the heels of our biggest post-war assistance effort — the Marshall Plan. Acording to Mr. Janeway's theory, however, 1949 should have been a boom year. But what about the recovery from that recession? The Korean expenditure boom certainly was not responsible since the recovery preceded the outbreak of hostilities by over six months.

On the other hand, how can the Defense Cycle theory explain the very slight increase of 3.3 pct in the Federal Reserve Board index of industrial production from 1951 to 1952 when government expenditures rose by a whopping $11.6 billion, or over 22 pct? And while courageously pinning his optimism for the future on the unknown quantity of expanded defense expenditures for the intercontinental missile crash program, he does not permit the known quantity of 1953 developments to interfere with his theory.

Thus, with government expenditures as the heart of his analytical system, he makes no mention of the contradictory fact that while the 22 pct increase in total government expenditures between 1951 and 1952 was accompanied by a 3.7 pct increase in gross national product, the smaller government expenditure increase of 10 pct from 1952 to 1953 was accompanied by the larger increase in gross national product of 4.5 pct.

What About Imports?

As for the "Marshall Plan Aid Comes Home" argument to explain the 1955 boom, this is even more incredible. It came home, according to Mr. Janeway, in the form of Europeans buying vastly more American products for the economies that the Marshall Plan helped reconstruct. But curiously, he says nothing about the reverse of this—Europeans selling in the United States what they were producing with their newly reconstructed economies. One helped offset the other. If we take out of one pocket as much as we put in the other, we clearly get no richer. But that is what happened.

Theodore Levitt

Besides all this, what is crucial is not simply how much Europeans buy and sell here, but what the whole world buys and sells here. On a quarterly basis, American exports of goods and services were $5.3 billion in June, 1952, $5.7 billion two years later, and only $5.5 billion in June, 1955. Where was the great increase to which Mr. Janeway attributes so much of our recovery?

As for things to explain the 1956

boom that Mr. Janeway predicts, to be sure accelerated defense spending is crucial, but it does not exhaust the whole of reality. Is it, for example, going to result in an equivalent increase in actual government cash outlays this year? That is the crucial question, and the answer is Federal defense expenditure increases budgeted for this year are not all going to be spent this year, and neither are those allocated for the civil economy. But unless they are spent they will not give the fillup that is expected.

Single Factor

Indeed, here is the great weakness of Mr. Janeway's Defense Cycle. What he proudly proclaims as his "heresy" is in fact an old and unfortunately ubiquitous phenomenon in economic analysis. This is the sin of "monocausal attribution"—that is of latching on to a single factor as explaining something which is multi-dimentional and multi-causal. Unfortunately, these monistic dogmas have had a captivating appeal for the less sophisticated reader, largely because they are superficially plausible and easy to understand.

A good bit of advice in economic dogma is that if it is declared as being simple, watch out.

Now Mr. Janeway is a competent craftsman and may be excused for some simplifications for the benefit of the lay reader. But I think he has gone much too far. He is certainly correct in a number of important respects. Today we have in effect two economies—a civil economy with a defense built on top of it.

Agree on Business Cycle

We live in an Age of Inflation. This is the most significant fact of our time. The conventional business cycle is indeed dead, but for a number of reasons—not just one. Slight changes in defense spending do have a potentially disproportionate effect on the economy, but they do not operate in a causal vacuum. Other things offset and modify them, and indeed can out perform them in the magnitude of effects.

Take for example the great expansion of pension funds. These now take several more billion dollars out of consumer income than they did even in 1948. If defense expenditures rise $2 billion this year, let us say, while contributions to employee benefit reserves rise by the same amount, the immediate effect is that the effects cancel out.

Or take taxes. The president's proposed 1956-57 budget calls for an increase in defense spending. But it also calls for an increase in tax collections, with a consequent offsetting effect. Now I believe it can be demonstrated logically and statistically that a $2 billion increase in government spending accompanied by a $2 billion increase in government tax collections is in fact not cancelling at all, that this has a positive stimulating effect equivalent to an increase in gross national product of $1 billion or more under present conditions.

Or, to cite one more of many examples of multi-causal cancelling effects, let us take government monetary policy. Mr. Janeway is justifiably agnostic on this matter. But, I believe, he again overworks his argument. Anybody who has had any dealings in the money market in the last five months knows that government monetary policy can be a sharp restraining tool. Presently contemplated increases in defense spending do not have things all their own way. If the authorities will it, or if they make a serious miscalculation in the wrong direction or at the wrong time, we can indeed have a period of slack activity or actual contraction.

Analysis Defined

Economic analysis and prediction is a complex business. But in our fast-moving economy no businessman can afford to be without the counsel of a trained, experienced economist. However, he has the right to know that what the economist offers is guideposts—not absolute certainty. His value lies in marshalling and sifting all the facts and applying to them the logic of his speciality in as creative a fashion as the present competence of economic analysis permits. He can cite the variety of alternative turns the economy might take and indicate why. Then his job is finished. Then it is up to the recipient of this information to make a choice among the alternatives.

Finally, if anybody is interested, as a consulting economist with one of the nation's largest manufacturing corporations as a regular (and I hope satisfied) client, I would be something more than reluctant to use Mr. Janeway's theory as the exclusive basis on which to predict the future.

It does no good to be right for wrong reasons.

The Background

▪ In its March 1, 1956 issue, The Iron Age printed an article by Economist Eliot Janeway. In his article, Mr. Janeway expounded his theory of the "Defense Cycle" as opposed to the traditional "Business Cycle" method of forecasting business trends.

▪ Like some other economists, Theodore Levitt was disturbed by the ideas advanced by Mr. Janeway and took exception to the basis of Mr. Janeway's conclusions. And Mr. Levitt took the time to say so in a letter to the editor which eventually took form as a full-fledged article in rebuttal.

▪ In a later issue, The Iron Age will carry a staff-written article rounding up the various methods being used by industry to put the finger on future twists and turns in business. This article will be based on a study by the National Industrial Conference Board.

AIR CONDITIONING: It's a Hot Market

Makers of cooling units are still recovering from 1954 . . . But field is now settled down to regular expansion of its markets . . . U. S. government is biggest single market potential—By *R. D. Raddant.*

◆ THE MAKINGS of a rebellion are stirring within the very walls of the nation's Capitol.

The agitators aren't Communists or subversives. Nor are they hiding behind the Fifth Amendment. They're eager to tell any investigating committee they are plotting to have U. S. Government buildings air conditioned against the steamy summer heat of Washington, D. C.

Department and bureau heads are sharpening their pencils to justify air conditioning on the basis of economics; measuring the loss of man hours because of summer closings, adding the intangibles of increased efficiency, higher morale, etc.

This isn't all joke. It is estimated by one authority that there is a $2 billion market potential in air conditioning government buildings.

May Get Laws

Another prominent executive in the air conditioning field believes there will be "a serious effort in Congress to pass legislation calling for air conditioning of federal structures."

What's going on in the government is being duplicated in the offices and plants of industry, as well as strenuous lobbying in the home. It points out why air conditioning is currently doing about $2 billion in business a year, with a potential of $5 billion annually by 1965.

It hasn't been easy. The air conditioning field is marked with many casualties that expired in the hotly competitive market. Even though the growing market is assured for the industry as a whole, it is still a dog-eat-dog situation with no guarantee for success for any maker.

Had Lean Years

Why is air conditioning such a tough market for success? It is a simple combination of too many manufacturers making too many units, for a market that has not developed as rapidly as anticipated —or hoped for.

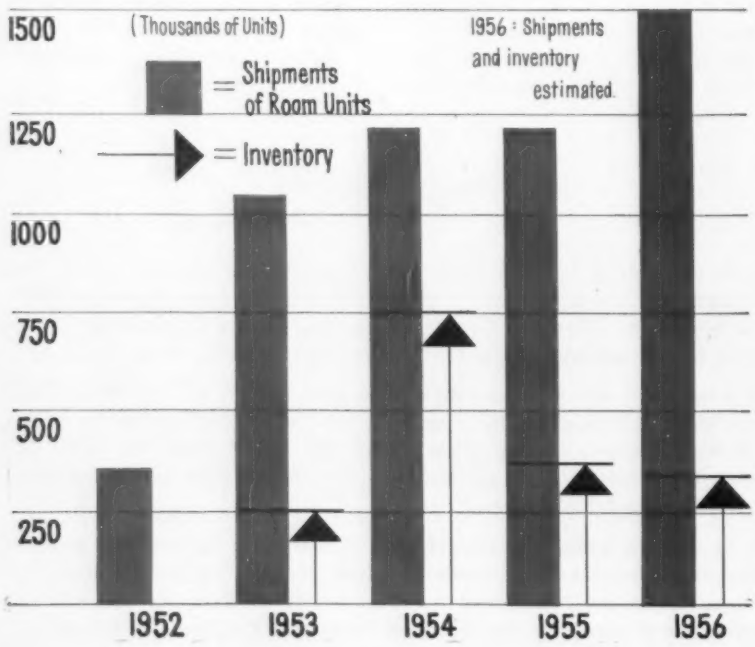
In 1952, the industry shipped 365,000 room air conditioning units and sold virtually all of them. As the youthful industry started to move, about 50 pct more producers entered the field in 1953 (many of them were end product handlers only, who had units made elsewhere, marketed them under their own name).

That year, the industry shipped over a million units, sold about 800,000, leaving an unsold inventory of about 250,000, despite the improved sales record. Then came 1954, the year that air conditioning people are just recovering from.

The industry "went wild," producing 1,230,000 units on top of the respectable inventory left over. What happened then was partly attributable to nature, partly to undeveloped distributor outlets. It was a cold June, when sales are usually highest. Result: the industry entered 1955 with an unsold inventory of about 750,000 room units, even after sales of nearly a million.

But 1955 saw the industry entering a period of normal markets and reasonable production. Although another 1,230,000 units were shipped, the inventory was cut in half by the end of the year. The stage is now set for a normal in-

Air Conditioning's Expanding Market



ROLLING off assembly line at Worthington Corp. are air conditioning units ready for immediate shipment to home or plant.

crease to 1,500,000 units this year, with hopes of selling all these and reducing the inventory still further.

What's Ahead

So the industry has completed its shake down, now seeks to develop its market potential by aggressive and intelligent sales, and is looking for new fields and new methods for the future.

The field is roughly divided between room air conditioning units and central units. Despite the vastly increased number of air conditioned offices and business places, the largest potential is the American home.

While room units have climbed from 365,000 units in 1952 to an estimated 1,500,000 for 1956, central systems have registered an even more significant climb. In 1952, 15,000 central systems were installed. In 1953, installations climbed to 50,000, to 75,000 in 1954, and to 130,000 in 1955. It is believed that this increase is going to continue at about that rate until a market of 750,000 installations a year is not out of this world.

This is based on the simple fact that there are 25 million homes in the U. S. with central heating systems, each a prospect for a central cooling system. New homes are being completed at a rate of about 1,250,000 a year.

Air conditioners are pushing the all-weather concept where a cooling unit can be combined with heating in original planning at much less cost than if it is installed in a completed home. A rough estimate is that unit air conditioning can be installed at a little less than 10 pct of the cost of the home.

Not a Luxury

Business is finding that air conditioning is not only desirable, it's necessary. Super markets, hotels, cocktail lounges, restaurants, all find that air conditioning is a competitive necessity in summer months. A large part of Florida's success in establishing itself as an all-season resort is attributed to air conditioning.

Office managers find that air conditioning is a must in recruiting desirable workers. Like government officials, they feel that it is not just a matter of comfort, but of increased efficiency and elimination of lost time from early closings.

Although there may be a fine line between air conditioning and refrigeration, a major market exists in industry where temperature control is necessary for specific operations.

These include the fields of precision machining, manufacturing of plastics and synthetics, bakeries and other industrial applications where temperature controls are desirable.

CENTRAL air conditioning units are gaining in acceptance. Worthington unit is shown being installed here.

Matthew M. Lawler, vice president and general manager of Worthington Corp. Air Conditioning and Refrigeration Div., says: "New developments which are commencing to affect the air conditioning industry and which will grow over the next few years are in the fields of laboratory experiments with nuclear energy, engines and motors, where laboratory experiments will be conducted to simulate sub-freezing temperatures, in the fields of automation and electronics.

"This latter field has already commenced to take hold with the new IBM Electronic Computer, for example, as well as the maintenance of close temperature control in telephone dial exchanges, etc."

A limiting factor on sales of room air conditioning units has been inadequate wiring of homes. However, a new size unit, commonly called a ¾ hp unit, is on the market. This can be installed in most homes without need for rewiring. Higher capacity of home wiring is still a goal of the industry. Central units require re-wiring of the house.

A word about the heat pump: While not a real factor in the market today, it may have the greatest potential, if a less expensive fuel can be developed. One source believes that in the next 25 years heat pumps may utilize by-products of atomic energy wastes or even solar energy.

The over production that occurred in 1954 has not been easy for the industry to weather. Quite a few producers have gone out of business in the stiff competitive market. It is frequently stated in the industry that prices have been cut and discounted too much.

Nevertheless, long range optimism prevails. Room unit producers, for example, once believed that demand would level off at about 1.75 to 2 million units a year. Then they would be in the same position as other appliance makers with 60 to 80 pct replacement business.

Now, they have raised their sights, believe that new units that are convenient for all windows, smaller and more attractive as well as more efficient, will keep demand on the upswing.

DEFENSE

Procurement:

Defense Dept. revising some of its policies.

Defense Department is revising its general procurement policies covering use of negotiated contracts, allowable costs, and allowable profits.

Revisions include a complete rewording of Section 15 of the Armed Services Procurement Regulations which covers cost principles and gives directions to procurement officers so that cost provisions of all contracts will be administered uniformly.

A second revision covers price negotiation policies and techniques. The military wants to spell out more clearly how buying officers are to use negotiated contracts and open bid procedures to get more standardization.

Effective Already

A bill to tighten up use of negotiated contracts is now pending in the Senate, but it would, Defense Department officials say, simply write into law restrictions set up voluntarily last October.

These restrictions permit negotiated contracts only to help distressed areas; to help small business programs; to buy nonperishable subsistence items; to give research and development contracts under $100,000, and to grant contracts under the "national emergency" clause. Each negotiated contract must be accompanied by justification.

House Charges

House Appropriations Committee had charged in a recent report that military procurement practices were "unrealistic," chaotic, wasteful, and gave private industry excessive profits.

Among the charges leveled by the Congressional probers: Military procurement, now running over 3 million contracts for goods costing more than $16 billion a year, permits purchases of materials already in surplus supply while shortages of some simple items prevent some weapons from functioning; millions of dollars worth of equipment is "lost" every year; and "unconscionable" delays and unrealistic delivery schedules are permitted in some contracts.

Industry profits are often too high; costs which should be borne by the contractor are often allowed to be charged to the government, and the military permits some firms to charge "excessive" executive salaries.

Airborne Atomic Unit

Mobility and firepower will be stressed in a new airborne division the Army will activate. Some officials view this as the ideal choice for quick dousing of brushfire wars which might occur.

The 11,500-man unit is to be designated the 101st Airborne Division. It will be smaller than the present standard airborne division by nearly 6,000 men, but its firepower capabilities are to be boosted by the use of atomic weapons. Initially, the division will be armed with the Honest John rocket, which can deliver an atomic warhead 30 miles.

Later, a new atomic weapon the Army is keeping secret will give the 101st additional punch, perhaps as a replacement for the 105mm howitzer. The division also gets the 90mm self-propelled antitank (SPAT) gun and the 106mm battalion antitank (BAT) gun.

Transportation is to be fast and lightweight, featuring a new series of trucks which can be dropped by parachute. For close-in movement of ammunition and other necessities, the 101st will have more than 700 low-silhouette "mechanical mules."

An aviation unit with small fixed-wing planes and two advanced types of helicopters will be integral to the division when it is ready for the field.

Missile Master

IMPORTANT part of the Army's Missile Master System for control and coordination of Nike missiles is an electronic tracking device. It has screens, much like radar, which receive and retain for finger-tip reference information in the form of impulses from photo-electric light guns. Although designed specifically for use with the Nike, the Missile Master is adaptable to any ground-to-air missiles. Besides the tracking device there are tactical controllers to assign targets and a friendly protector to prevent firing on friendly aircraft.

EXPANSION IN INDUSTRY

Aluminum:

Kaiser to add 55 million lb to Chalmette capacity.

Kaiser Aluminum and Chemical Corp. will add 55 million lb to the annual capacity of its aluminum reduction plant at Chalmette, La., already one of the industry's largest. Additional output will bring the Kaiser installation's potential to 495 million lb per year.

A new potline, the plant's ninth, will be added in two new pot-room buildings, each more than 1100 ft in length. The line will contain 144 electrolytic cells.

Power for the new line will be provided by present Chalmette facilities supplemented by some purchased power.

Alumina requirements will be supplied by a new alumina plant to be built at Gramercy, La.

Additional production facilities are expected to be in operation by the summer of 1957.

Other Kaiser expansion plans include a new reduction plant at Ravenswood, W. Va., and additions to the firm's plants at Tacoma and Mead, Wash.

Solar Strip Mill

Solar Steel Co., Cincinnati, has just put into operation a new strip mill to process cold rolled strip up to six inches in width.

New system provides for tempers in strip in a full range from dead soft to No. 1 hard temper. It also provides for strip finishes in ranges from No. 1 dull finish to No. 2 regular bright.

Big Bumpers

Udylite Corp. has recently received an order from the Ford Motor Co. for one of the largest plating installations in the world. Two straight line automatic machines for plating bumpers are being installed at Ford's Monroe, Mich., parts plant. Both are expected to be in full operation by June, 1957.

The Udylite machines, the largest rack type ever built, will be over 750 ft long. Installation will include 80 motor generator sets and the ventilation system will have a capacity of over 700,000 cfm.

With car bumpers becoming larger and more cumbersome to handle, plating the whole bumper at once has become a problem for many manufacturers.

Republic Central Lab

Republic Steel Corp. has taken an option on a 40-acre tract in a Cleveland suburb for the construction of a central research center.

The goal of the project is to bring together several of the company's research groups which heretofore have been working in widely separated areas.

Current plans call for the construction of two buildings, one to house the offices, meeting rooms, a library, photographic and X-ray facilities, and the other the principal laboratories.

Cities Need More Water

◆ INDUSTRIAL growth and population increases are tightening the pressure on water supplies in America's urban areas, forcing about one of every four cities to begin planning expansion of pumping facilities and distribution systems.

Figures from a new U. S. Public Health Service survey of the availability of water in 1,532 communities show that 367 need added supplies. Survey covered all facilities serving 10,000 or more persons and 40 pct of those serving between 5,000 and 10,000.

This survey includes the population provided for, supply sources, present capacity and storage arrangements, and improvements which local officials consider necessary. It was performed as part of the government's mobilization readiness planning activities.

Sparse rainfall in many areas in recent years has created water shortages which are likely to increase as population swells and industry expands, points out G. E. McCallum, chief of the USPHS water supply and water pollution control program. Conservation measures, he says, are taking on greater importance.

Statistics from the new water supply survey show:

Survey: More Pressure for Water

NEEDED IMPROVEMENTS	NO. OF FACILITIES	PCT OF TOTAL	POPULATION SERVED (in thousands)
Development of new underground water sources	259	16.9	10,940
Development of new surface water sources	126	8.2	9,020
Main transmission lines	284	18.5	27,610
Pumping facilities	365	23.8	33,260
Treatment facilities	304	19.8	39,330
Ground level reservoirs	193	12.6	20,340
Elevated storage tanks	304	19.8	20,720
Distribution systems	358	23.4	33,870
Total	815		64,610

FINANCIAL

STEEL: 1955 Was A Profitable Year

Sustained demand booms production, sales and profits . . . Sales up 32 pct . . . Net income jumps 72 pct . . . But some steel leaders question long-range health of industry . . . Prices questioned—By G. J. McManus.

◆ THERE MAY be some question as to the significance, but there's no doubt about the fact: Steel enjoyed a very prosperous year in 1955.

A roundup of 29 companies, representing 93 pct of the country's steel capacity, shows that production, sales and profits all zoomed last year. High points in steel's 1955 record, as compiled in THE IRON AGE annual financial analysis, include the following:

The Record

Production: Up 32 pct from 82 million ingot tons in 1954 to over 109 million tons in 1955.

Sales: Up 32 pct from $10 billion in 1954 to over $13 billion in 1955.

Net income: Up 72 pct from $559 million in 1954 to over $1 billion in 1955.

Biggest single factor in the 1955 success story was sustained demand. The industry came into the year with automotive, construction and appliance orders on the rise. The boom fever spread; inventory buying came back; the rush for steel was on. Only agriculture and freight car business lagged, but when they finally entered the market, railroads placed orders that made the year the best since 1922 in this category.

Spend for Expansion

In the face of this pressure for steel, producers ran wide open for most of the year. They weighed in with an operating rate of 93 pct—30 pct better than 1954.

The industry continued to improve and expand production facilities. Invested capital rose 9 pct during the year. A highly significant gain was registered in the area of net income as a percent of investment.

This rose from 7.3 pct in 1954 to 11.3 in 1955.

Still Have Problem

Despite these impressive figures there are some who question the long-range health of the steel industry. National Steel head E. T. Weir recently complained that steel prices are too low to provide the funds for urgently-needed expansion. Others have long felt that steel pricing retards growth by leaving companies short of expansion capital and discouraging outside investors.

On this point, the industry appears to be in fairly good shape at the moment. Common dividends declared increased more than 30 pct from $274 million in 1954 to $361 million in 1955. Earnings per share of common stock rose from $4.76 in 1954 to $7.16 in 1955.

These and other gains are bound to come up in this June's discussion of steel wages and prices. Board chairman Roger Blough of U. S. Steel took a slap at labor recently, charging that union demands were responsible for the country's inflation troubles.

Union Defense

David McDonald, chief of the Steelworkers union, quickly replied that modernization moves were constantly increasing worker productivity. He said substantial wage increases could be granted without boosting steel prices. Last year, steel wages went up 15¢ an hour; prices rose roughly $7 a ton.

'55 Steel Earnings—The Top Twelve

Net income, in thousands of dollars, of 12 steel companies rated in order of reported 1955 profits, with pct of change from 1954 is as follows:

COMPANY	1955	1954	pct of change
United States Steel Corp.	$370,099	$195,417	+ 89.4
Bethlehem Steel Corp.	180,191	132,837	+ 35.6
Republic Steel Corp.	86,271	52,875	+ 63.2
Armco Steel Corp.	64,350	41,100	+ 56.6
Inland Steel Co.	52,466	41,287	+ 27.1
Jones & Laughlin Steel Corp.	50,104	25,032	+ 100.2
National Steel Corp.	48,289	30,334	+ 59.2
Youngstown Sheet & Tube Co.	41,701	20,182	+ 106.6
Wheeling Steel Corp.	17,295	9,595	+ 80.3
Allegheny Ludlum Steel Corp.	14,985	4,246	+ 253.0
Crucible Steel Co.	13,208	3,705	+ 229.0
Granite City Steel Co.	12,610	4,012	+ 216.0

Why 88 shops bought WARNER & SWASEY 2 AC's *before the first one was even built!*

AND ORDERS CONTINUE TO COME IN! It's a "capacity house" on the 2 AC production line in the Warner & Swasey plant. We're turning out 2 AC's as fast as high precision machine production permits.

TWO YEARS AGO 88 buyers placed their orders, based on their confidence in the *proven* Warner & Swasey design principle behind this new automatic.

For its smaller predecessor—Warner & Swasey's 1 AC—had *proved* its value in plants throughout the land.

Today this confidence has been substantiated by the 2 AC's field performance. And we are doing our best to meet the increasing demand for these machines.

Both Warner & Swasey Single Spindle Automatics are designed for *fast setup*, like a turret lathe. This makes it possible to profitably machine *turret lathe lots*, but on an automatic basis. They use many *turret lathe tools*—provide the *flexibility* of a turret lathe—*accuracy* beyond traditional automatic performance, but require less skilled operators to achieve that accuracy.

These automatics put more finished pieces on the floor every day, because they turn all surfaces at the right speeds and feeds, regardless of the length of the cut, and virtually eliminate operator fatigue.

Take a look at owners' comments. If one suggests a production improvement for your shop, call in your Warner & Swasey Field Representative—get the facts on how Warner & Swasey Single Spindle Automatics can pay off for *you.*

SHOP A REPORTS:

Greater Precision!—"We found in our shop that on large diameter cylinder work our hand-operated machines were no longer providing the high degree of accuracy needed. Since installing 2 AC's, we are consistently holding 40 micro-inch finishes and .0005" tolerances, because the cutting tools are held close to the pentagon turret, minimizing tool overhang."

SHOP B REPORTS:

Fast Pay-off on Small Lots!—"Not until we installed a pair of 2 AC's did we fully appreciate their fast setup features and efficiencies on small lot work. One part, in 58-piece lots, took 15 minutes on hand machines—now only 5 minutes on the 2 AC. Another 70-piece lot took 20 minutes per piece—now 7 minutes. Multiply these savings over a range of small lot work and you'll understand why our 2 AC is paying itself off fast!"

SHOP C REPORTS:

Ample Metal Removal Capacity
"A recent sub-contract job called for machining a lot of 5⅛ dia. x 9½ long 1050 steel slugs weighing 34 lbs. each. They required some heavy duty machining—large diameter drilling, counterboring, turning, undercutting and forming. Hand machine time had been 2 hours 40 minutes per piece. Our 2 AC cut cycle time to 52 minutes, removing 20 lbs. of metal per piece. Maximum rigidity has certainly been designed into the 2 AC!"

SHOP D REPORTS:

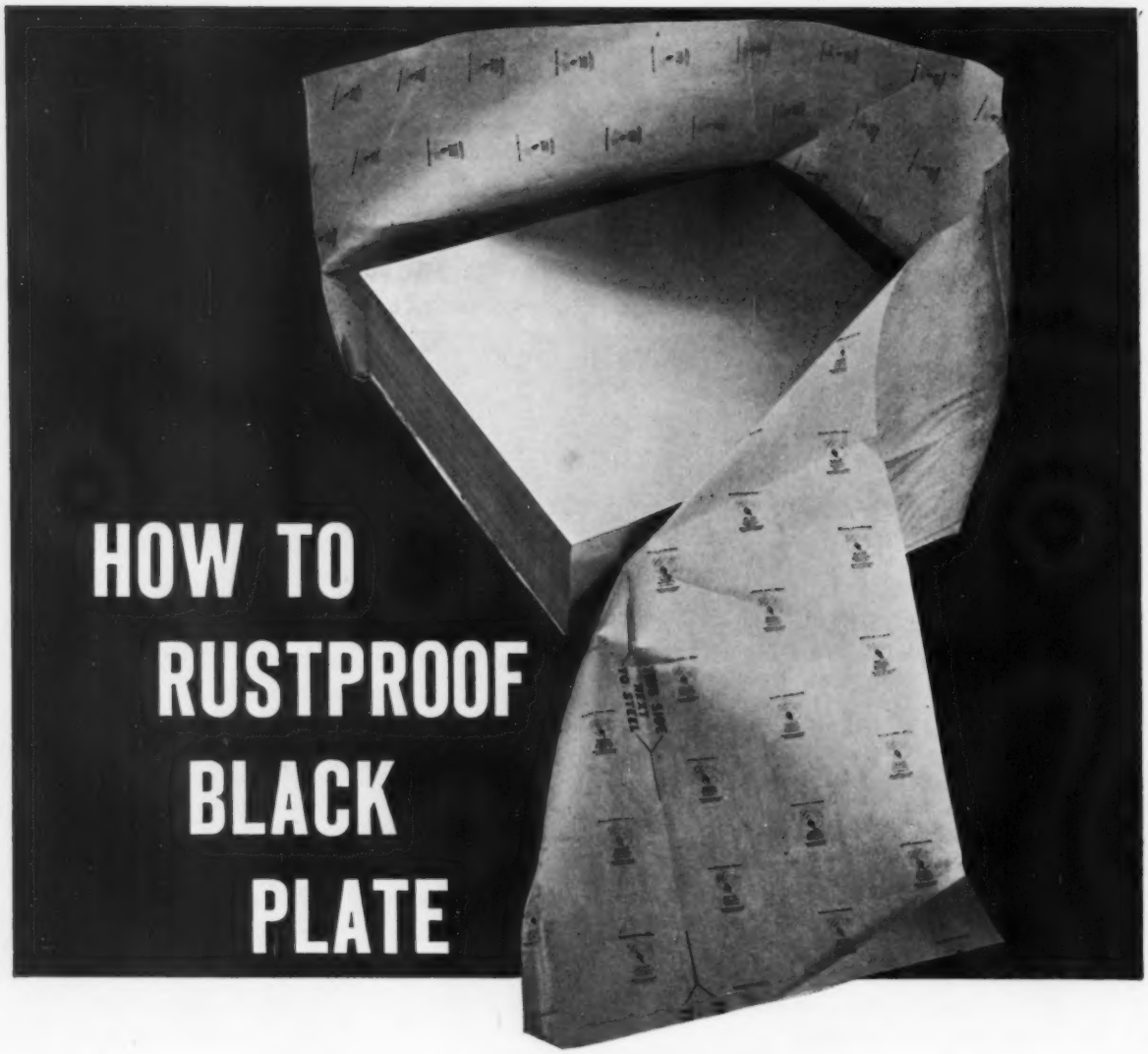
Floor Space Savings—"A production efficiency study and turning department survey indicated the need for rearrangement of manufacturing facilities, for smoother work flow, and additional modern equipment. Floor space was limited. Additional turret lathes would have to be placed outside the turning department, and would disrupt the work flow pattern. Adding 2 AC's—producing an average of 2 to 1 over turret lathes—solved our problem. They gave us the extra capacity needed within the turning department."

SHOP E REPORTS:

Uses Standard Turret Lathe Tooling—"When we installed our 2 AC's we purchased only a minimum of standard tools. We found the majority of our shank-type turret lathe tools were interchangeable. Our initial tooling investment was therefore substantially reduced. And now it is easy, too, for one operator to tend two machines, consistently producing over 4 times as many pieces with less effort—all of uniform quality, with no scrap loss, and at lower cost."

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY



HOW TO RUSTPROOF BLACK PLATE

Rust is a problem anytime, but it's particularly serious with black plate. On this light gauge, dry, uncoated steel, rust can start from a fingerprint. "Sweating" due to sharp temperature changes will cause immediate rusting on surfaces and edges.

Leading mills are now eliminating rust problems by packaging black plate in Ferro-Pak, Cromwell's volatile corrosion inhibitor paper. Chemical vapors from Ferro-Pak form an invisible film around the steel that prevents rust from getting a start, even when moisture is present.

The new Ferro-Pak sheet above was custom-made by Cromwell's "Paper Engineers" to meet steel mill requirements for shipping black plate and dry sheet steel. It is water-proof, strong, yet highly flexible and easy to handle. Its chemical rust inhibitor is non-toxic . . . compatible with oil . . . stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write **Cromwell Paper Company, 4803 South Whipple St., Chicago 32, Illinois.**

FERRO-PAK® by Cromwell
"Paper Engineers"

RUSTPROOFING A FREIGHT CAR. Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.

Common Stock	Surplus	Invested Capital	Working Capital	Net Income Percent of Investment	Year	COMPANY
$91,587,900	$1,330,703,051	$2,868,655,585	$695,141,324	13.2	1955	U. S. Steel Corp.
$79,700,733	1,108,730,808	2,672,832,918	752,013,221	7.5	1954	
05,445,730	787,236,115	1,522,975,045	809,994,475	12.4	1955	Bethlehem Steel Corp.
03,459,830	683,072,085	1,232,094,615	500,163,398	11.3	1954	
54,585,856	451,511,235	650,126,815	256,130,416	13.7	1955	Republic Steel Corp.
71,252,702	366,597,099	629,318,251	226,397,167	9.1	1954	
62,769,000	328,613,000	526,212,000	165,330,000	10.2	1955	Jones & Laughlin Steel Corp.
61,906,000	292,204,000	497,439,000[1]	123,977,900	5.8	1954	
73,796,850	324,154,051	452,911,987[3]	123,520,562	11.0	1955	National Steel Corp.
73,620,450	299,228,093	427,082,106	121,769,438	7.5	1954	
06,314,056	256,576,715	462,890,771	218,104,489	10.03	1955	Youngstown Sheet & Tube Co.
05,243,374	227,520,958	432,764,332	183,084,512	5.45	1954	
93,633,807	238,665,494	416,415,101	165,895,150	12.9	1955	Inland Steel Co.
78,016,383	209,243,572	384,261,755	158,151,492	11.2	1954	
06,341,123	280,345,277	444,015,755	182,802,349	14.95	1955	Armco Steel Corp.
52,295,736	287,359,698	403,749,452	147,783,281	10.78	1954	
13,442,248	90,215,453	170,325,365	66,703,600	7.98	1955	Colorado Fuel & Iron Corp.[4]
13,017,911	82,485,486	163,732,675	66,603,270	6.02	1954	
19,097,800	85,034,576	229,796,667	76,442,071	8.16	1955	Wheeling Steel Corp.
37,054,498	83,868,214	205,866,412	64,004,121	5.53	1954	
3,200,000	63,266,577	245,329,442	44,969,897	4.66	1955	Kaiser Steel Corp.[4]
3,200,000	61,098,269	245,984,849	49,643,814	5.52	1954	
11,060,390	57,038,561	73,098,951	33,401,989	11.2	1955	Sharon Steel Corp.
11,060,390	51,800,939	68,711,329	34,245,503	4.9	1954	
41,029,000	56,998,410	128,847,921	49,185,740	11.30	1955	Crucible Steel Co. of America
20,544,607	40,555,916	119,995,023	38,920,545	4.35	1954	
14,411,020	47,454,143	118,397,226	31,699,615	7.64	1955	Pittsburgh Steel Co.
14,525,692	41,272,681	116,385,912	24,713,170	3.22	1954	
25,233,365	38,482,977	102,436,342	33,176,588	14.0	1955	Granite City Steel Co.
20,566,605	27,917,502	90,232,973	17,545,037	6.0	1954	
12,936,072	24,808,306	127,716,528	22,460,702	7.6[9]	1955	McLouth Steel Corp.
12,936,072	18,077,464	132,513,536	15,417,820	2.4[9]	1954	
3,227,700	19,594,852	22,822,552	8,284,403	2.87	1955	Barium Steel Corp.
3,082,737	19,139,945	22,222,682	4,879,173	*2.0*	1954	
1,777,706	85,015,015	121,125,921	48,721,490	13.23	1955	Allegheny Ludlum Steel Corp.
1,689,360	70,249,590	112,580,450[12]	36,711,947	4.66[12]	1954	
4,089,125	16,761,565	29,585,467	9,762,965	15.6	1955	Northwestern Steel & Wire Co.[16]
4,089,125	13,038,509	22,033,840	910,630	8.5	1954	
1,065,491	21,825,964	22,891,455	8,572,082	.04	1955	Newport Steel Corp.[13]
1,065,491	20,910,757	21,976,248	7,593,704	...	1954	
3,179,760	25,154,853	34,334,613	15,516,158	5.9	1955	Lukens Steel Co.
3,179,760	23,980,073	33,589,833	13,881,718	6.9	1954	
3,018,932	33,936,920	85,693,209	23,274,336	9.6	1955	Detroit Steel Corp.
2,419,017	29,638,293[12]	75,261,485	10,927,018	3.6	1954	
6,757,350	17,926,635	35,951,285	8,104,567	7.8	1955	Alan Wood Steel Co.
6,560,530	16,774,062	36,647,492	5,425,875	4.7	1954	
3,776,090	22,321,806	35,574,896	18,601,781	7.52	1955	Copperweld Steel Co.
2,575,940	16,904,424[12]	29,130,114	11,946,456	3.32	1954	
2,640,000	24,282,207	102,838,289	27,498,575	8.6	1955	Lone Star Steel Co.
2,640,000	19,523,120	105,036,365	21,751,693	*3.07*	1954	
4,125,000	17,533,785	24,658,700	14,065,928	16.89	1955	Laclede Steel Co.
4,125,000	14,724,232	22,106,598	12,130,148	13.89	1954	
2,604,167	28,692,623	31,296,790	13,186,461	28.02	1955	Keystone Steel & Wire Co.
2,604,167	23,674,104	26,278,271	10,506,874	23.27	1954	
6,967,000	10,993,385	22,981,385	8,192,801	16.9	1955	Rotary Electric Steel Co.
3,483,500	12,098,211	18,779,711	6,373,712	10.3	1954	
7,018,798[15]	13,502,295	22,921,084	10,542,829	13.64	1955	Continental Steel Corp.
7,018,798[15]	11,984,235	21,603,024	9,430,096	9.74	1954	
85,131,336	4,798,643,146	9,132,827,147	3,189,283,343	11.30	1955	GRAND TOTAL
02,934,408	4,173,672,366	8,370,211,251	2,664,491,833	7.3	1954	
+4.3	+14.9	+9.1	+19.7	+54.8		Percent change 1955 over 1954

stock.
led Oct. 31.
ed on national operating rate.
or industry by AISI.

Italics indicate loss or credit.

STEEL INDUSTRY FINANCIAL ANALYSIS 1955-1954

DATA COVER OPERATIONS OF 29 COMPANIES REPRESENTING 93 PCT OF THE INGOT CAPACITY OF THE UNITED STATES AS OF JAN. 1, 1955

COMPANY	Year	Ingot Capacity Net Tons	Ingot Production Net Tons	Percent of Capacity Operated	Steel Shipments Net Tons	Net Sales and Operating Revenue	Provision for Federal Income Taxes	Net Income	Net Income Percent of Sales	Number of Common Shares Outstanding	Earnings Per Common Share	Common Dividends Declared	Nu Pr S Out
U. S. Steel Corp.	1955	38,877,000	35,309,000	90.8	25,506,000	$4,097,680,287	$366,000,000	$370,099,353	9.0	53,495,274	$6.44	$122,907,433	
	1954	38,715,000	28,355,000	73.2	20,239,000	3,250,369,279	190,000,000	195,417,611	6.0	52,782,044	3.23	85,517,366	
Bethlehem Steel Corp.	1955	19,100,000	18,820,912	98.5	13,553,823	2,114,599,636	181,000,000	180,191,708	8.5	9,597,127	18.09	69,490,469	
	1954	18,500,000	13,810,076	74.6	10,226,732	1,667,377,179	119,000,000	132,837,154	8.0	9,582,942	13.18	55,101,916	
Republic Steel Corp.	1955	10,262,000	9,680,121	97.1	6,988,782	1,188,559,765	84,000,000	86,271,491	7.3	15,437,177	5.59	38,404,321	
	1954	10,262,000	6,972,812	69.8	5,012,330	846,310,670	49,900,000	52,875,164	6.2	7,325,956	3.55[2]	28,940,737	
Jones & Laughlin Steel Corp.	1955	6,166,500	6,190,000	100.0	4,418,000	696,538,000	46,500,000	50,104,000	7.2	6,293,770	7.73	14,042,000	
	1954	6,166,500	4,570,000	74.0	3,203,000	492,941,000	22,543,000	25,032,000	5.1	6,196,554	3.80	12,396,000	
National Steel Corp.	1955	6,000,000	.....	.....	.....	622,018,919	48,275,000	48,289,453	7.8	7,379,685	6.54	23,940,275	
	1954	6,000,000	.....	.....	.....	484,058,380	27,750,000	30,334,871	6.3	7,362,045	4.12	22,009,698	
Youngstown Sheet & Tube Co.	1955	5,520,000	5,571,556	100.9	3,944,492	626,232,840	41,867,500	41,701,140	6.8	3,378,506	12.34	12,645,383	
	1954	5,520,000	3,868,525	70.1	2,606,540	433,406,272	12,104,000	20,182,500	4.7	3,353,546	6.02	12,566,618	
Inland Steel Co.	1955	5,000,000	5,189,509	103.8	3,954,567	663,317,374	53,050,000	52,466,098	8.0	5,509,767	9.52	23,044,176	
	1954	4,700,000	4,522,257	96.2	3,707,750	537,024,479	37,930,000	41,287,152	7.7	5,215,967	7.92	18,942,069	
Armco Steel Corp.	1955	4,950,000	5,099,905	103.0	4,003,532	692,683,234	66,613,787	64,350,609	9.3	10,634,112	6.05	20,625,713	
	1954	4,902,000	4,448,772	90.8	3,171,401	532,045,314	42,522,317	41,100,266	7.7	5,229,574	3.93[3]	15,645,892	
Colorado Fuel & Iron Corp.[4]	1955	2,471,500	1,936,402	78.35	1,627,587	257,543,050	10,681,800	10,887,163	4.2	2,705,671	3.79	2,924,786	
	1954	2,469,035	1,845,693	74.75	1,687,950	250,235,696	6,125,000	7,051,729	2.8	2,603,462	2.46	1,858,420	
Wheeling Steel Corp.	1955	2,130,000	2,057,288	96.6	.....	249,445,016	18,480,000	17,295,711	6.9	1,909,780	8.12	5,322,941	
	1954	2,130,000	1,589,643	74.6	.....	190,224,955	8,483,000	9,595,740	5.0	1,425,173	5.48[5]	4,272,175	
Kaiser Steel Corp.[4]	1955	1,536,000	1,432,742	93.3	929,556	136,148,919	.....	5,471,236	4.2	3,200,000	1.08	1,279,958	
	1954	1,536,000	1,382,877	90.0	933,843	128,491,032	3,325,000	7,926,666	6.2	3,200,000	1.75	1,599,854	
Sharon Steel Corp.	1955	1,550,000	1,528,686	98.6	1,092,593	173,095,949	7,840,000	7,987,622	4.6	1,100,000	7.26	2,750,000	
	1954	1,550,000	846,515	54.6	611,668	99,347,910	1,865,000	3,134,864	3.2	1,100,000	2.85	2,750,000	
Crucible Steel Co. of America	1955	1,351,400	1,222,176	90.4	.....	237,715,380	15,570,000	13,208,602	5.6	1,641,162	8.05	3,600,037	
	1954	1,351,400	808,729	59.8	.....	160,621,738	4,398,000	3,705,952	2.3	821,784	2.83	8% stk. div.	
Pittsburgh Steel Co.	1955	1,320,000	1,303,503	98.8	1,132,437	177,707,556	4,372,000	7,515,470	4.3	1,441,102	4.31	355,981[7]	
	1954	1,320,000	1,070,386	76.2	784,420	124,438,118	*2,129,000*[6]	2,170,694	1.8	1,386,644	.62	8% stk. div.	
Granite City Steel Co.	1955	1,080,000	1,091,389	101.0	961,101	116,293,657	13,703,700	12,610,820	11.0	2,017,074[8]	6.05	3,876,744	
	1954	1,080,000	634,909	59.0	559,112	69,265,197	4,400,700	4,012,192	6.0	1,640,409[8]	2.04	1,846,233	
McLouth Steel Corp.	1955	1,200,000	.....	.....	.....	144,987,476	7,375,000	8,148,342	5.6	1,189,600	5.66	.....	
	1954	960,000	.....	.....	.....	59,133,532	*2,090,000*	1,694,890	2.9	1,189,600	.83	.....	
Barium Steel Corp.	1955	893,000	520,900	58.3	.....	75,084,700	995,255	655,319	.9	3,227,700	.20	906,001[10]	
	1954	893,000	237,000	26.5	.....	53,484,604	*1,772,500*	*441,212*	.8	3,082,737	.14	1,521,240[11]	
Allegheny Ludlum Steel Corp.	1955	864,200	683,195	79.1	464,231	255,587,054	16,554,000	14,985,660	5.9	1,777,706	8.25	4,030,086	
	1954	864,200	431,068	49.9	305,208	170,056,405	4,459,000	4,246,083	2.5	1,689,360	2.30	3,378,719	
Northwestern Steel & Wire Co.[16]	1955	825,000	502,443	60.9	391,675	51,403,405	4,610,000	4,131,969	8.0	817,825	5.05	408,913	
	1954	825,000	308,750	37.4	246,170	35,628,171	1,065,000	1,018,754	2.9	817,825	1.25	None	
Newport Steel Corp.[13]	1955	708,537	480,038	68.0	334,203	37,419,274	979,638	915,233	.....	1,060,988	.86	.....	
	1954	708,537	154,658	29.0	119,238	18,371,670	255,000	*62,012*	.....	1,065,491	.06	213,098	
Lukens Steel Co.	1955	750,000	691,444	92.2	490,569	79,307,572	2,400,000	1,731,238	2.2	317,976	5.44	556,458	
	1954	675,000	631,834	93.6	455,153	74,954,710	2,065,000	2,014,791	2.7	317,976	6.33	1,112,916	
Detroit Steel Corp.	1955	1,290,000	888,443	68.9	787,788	101,803,010	6,715,966	6,317,860	6.2	3,018,953	2.07	754,733	
	1954	660,000	442,753	67.08	371,081	51,707,907	71,338	862,528[12]	1.7[12]	2,419,017	.36	.....	
Alan Wood Steel Co.	1955	625,000	665,908	106.5	462,046	58,375,609	1,619,000	2,551,530	4.4	675,735	3.32	918,474[7]	
	1954	625,000	345,918	55.3	241,288	36,085,476	216,000	1,246,251	3.4	656,053	1.42	218,684[7]	
Copperweld Steel Co.	1955	618,380	.....	.....	.....	78,490,150	2,990,000	2,365,459	3.0	755,218	2.81	995,834	
	1954	618,380	.....	.....	.....	49,711,246[12]	602,970[12]	703,150[12]	1.4[12]	515,188	.88[12]	927,339	
Lone Star Steel Co.	1955	550,000	556,304	101.0	442,762	74,489,168	4,665,000	4,759,086	6.4	2,640,000	1.80	.....	
	1954	550,000	379,009	69.0	184,497	37,208,044	.....	*1,008,778*	*2.7*	2,640,000	.38	.....	
Laclede Steel Co.	1955	500,000	473,708	94.7	386,408	58,191,338	4,700,000	4,047,053	7.0	206,250	19.62	1,237,500	
	1954	500,000	396,023	79.2	311,140	45,364,073	3,050,000	2,943,150	6.5	206,250	14.27	1,320,000	
Keystone Steel & Wire Co.	1955	425,000	416,090	97.90	344,414	62,020,363	8,830,268	8,768,519	14.1	1,875,000	4.68	3,750,000	
	1954	425,000	334,444	78.7	275,229	49,332,276	6,981,536	6,114,772	12.4	1,875,000	3.26	3,000,000	
Rotary Electric Steel Co.	1955	300,000	270,283	90.1	193,807	54,370,322	4,150,000	3,772,074	7.0	696,700	5.41	1,393,400	
	1954	300,000	172,916	57.6	117,165	31,643,659	1,938,000	1,849,810	5.9	348,350	5.31	1,045,050	
Continental Steel Corp.	1955	394,000	384,380	97.6	285,972	44,881,747	2,760,000	3,022,143	6.7	501,361[14]	6.02	1,504,083	
	1954	394,000	336,149	85.3	232,108	35,661,856	1,600,000	1,993,337	5.6	501,361[14]	3.97	1,002,722	
GRAND TOTAL	1955	117,257,517	109,000,000[17]	93.0[18]	78,800,000[17]	13,225,990,770	1,027,297,914	1,034,621,961	7.8	144,501,219	7.16	361,665,719	
	1954	115,200,052	82,000,000[17]	71.0[18]	58,700,000[17]	10,014,500,848	548,748,361	599,840,069	6.0	126,350,308	4.76	274,486,746	
Percent change 1955 over 1954		+1.8	+32.9	+31.0	+34.2	+32.1	+87.2	+72.0	+30.0	+14.4	+50.4	+31.8	

1. Payable after one year.
2. Adjusted to reflect 2 for 1 stock split in 1955.
3. Less treasury stock.
4. Fiscal year ended June 30.
5. $4.98 after effect 10 pct stock dividend distributed 1955.
6. After refund and adjustments prior years income taxes.
7. Plus stock dividend.
8. Excludes 1595 shares in 1955 and 4919 in 1954 represented by scrip certificates.
9. After adjustment of interest to reflect its income tax effect on net income.
10. Stock dividend of 5 pct.
11. Includes stock
12. Revised.
13. Fiscal year end
14. Includes 259 s

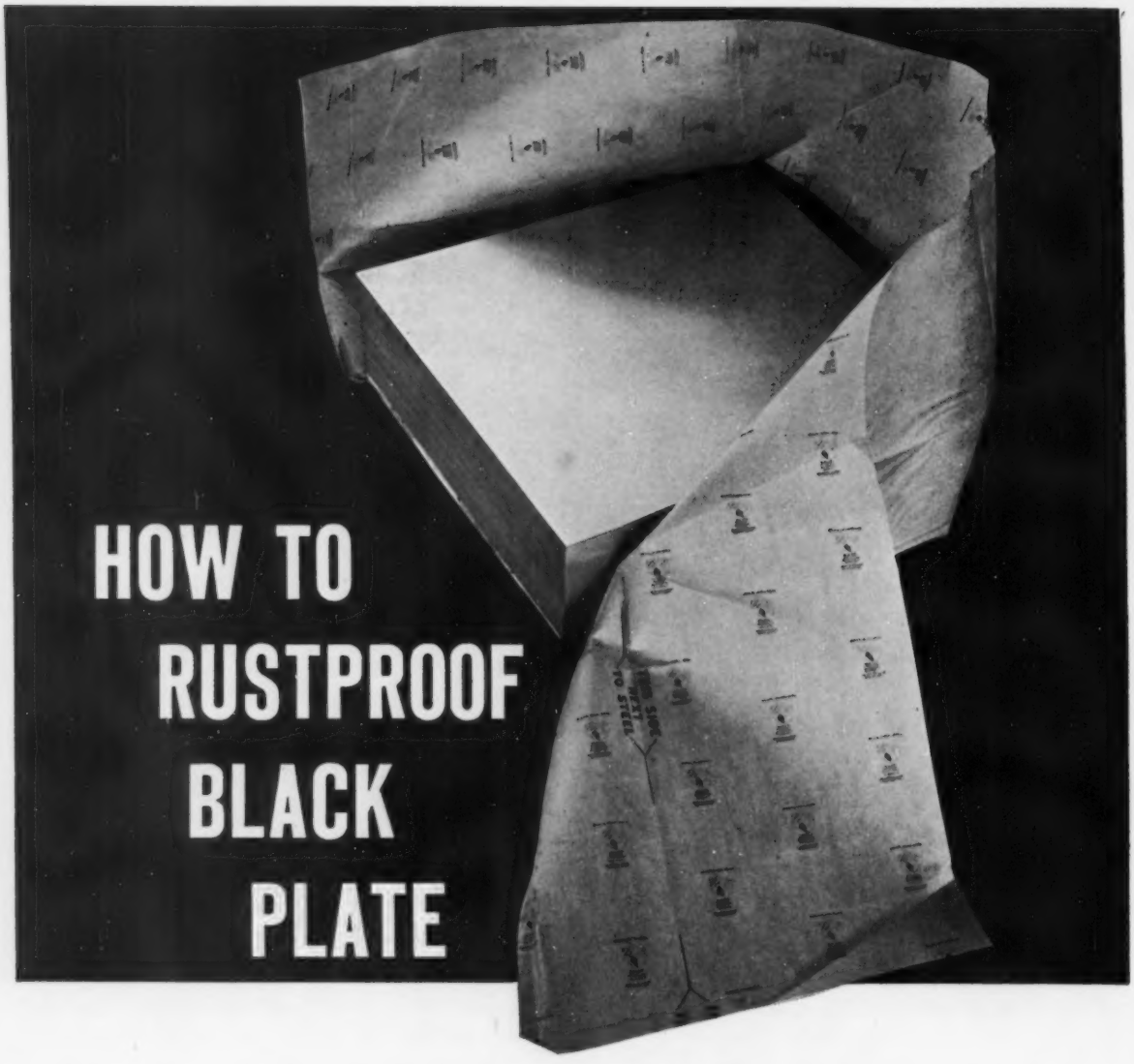
Number of Preferred Shares Outstanding	Preferred Dividends Declared	Funded Debt[1]	Preferred Stock	Common Stock	Surplus	Invested Capital	Working Capital	Net Income Percent of Investment	Year	COMPANY
3,602,811	$25,219,677	$286,083,534	$360,281,100	$891,587,900	$1,330,703,051	$2,868,655,585	$695,141,324	13.2	1955	U. S. Steel Corp.
3,602,811	25,219,677	324,120,277	360,281,100	879,700,733	1,108,730,808	2,672,832,918	752,013,221	7.5	1954	
933,887	6,537,209	336,904,500	93,388,700	305,445,730	787,236,115	1,522,975,045	809,994,475	12.4	1955	Bethlehem Steel Corp.
933,887	6,537,209	152,174,000	93,388,700	303,459,830	683,072,085	1,232,094,615	500,163,398	11.3	1954	
None	.....	44,029,724	None	154,585,856	451,511,235	650,126,815	256,130,416	13.7	1955	Republic Steel Corp.
None	846,129	91,468,450	None	171,252,702	366,597,099	629,318,251	226,397,167	9.1	1954	
293,568	1,468,000	105,473,000	29,357,000	62,769,000	328,613,000	526,212,000	165,330,000	10.2	1955	Jones & Laughlin Steel Corp.
293,568	1,468,000	113,972,000	29,357,000	61,906,000	292,204,000	497,439,000[5]	123,977,000	5.8	1954	
None	.....	55,000,000	None	73,796,850	324,154,051	452,911,987[3]	123,520,562	11.0	1955	National Steel Corp.
None	.....	55,000,000	None	73,620,450	299,228,093	427,082,106	121,769,438	7.5	1954	
None	.....	100,000,000	None	106,314,056	256,576,715	462,890,771	218,104,489	10.03	1955	Youngstown Sheet & Tube Co.
None	.....	100,000,000	None	105,243,374	227,520,958	432,764,332	183,084,512	5.45	1954	
None	.....	84,115,800	None	93,633,807	238,665,494	416,415,101	165,895,150	12.9	1955	Inland Steel Co.
None	.....	97,001,800	None	78,016,383	209,243,572	384,261,755	158,151,492	11.2	1954	
None	.....	57,329,355	None	106,341,123	280,345,277	444,015,755	182,802,349	14.95	1955	Armco Steel Corp.
None	.....	64,094,018	None	52,295,736	287,359,698	403,749,452	147,783,281	10.78	1954	
226,058	634,034	55,312,000	11,355,664	13,442,248	90,215,453	170,325,365	66,703,600	7.98	1955	Colorado Fuel & Iron Corp.[4]
237,812	647,766	56,300,000	11,929,278	13,017,911	82,485,486	163,732,675	66,603,270	6.02	1954	
357,526	1,787,630	48,944,800	35,752,600	19,097,800	85,034,576	229,796,667	76,442,071	8.16	1955	Wheeling Steel Corp.
357,526	1,787,630	49,191,100	35,752,600	37,054,498	83,868,214	205,866,412	64,004,121	5.53	1954	
1,564,865	2,292,970	130,943,547	39,121,625	3,200,000	63,266,577	245,329,442	44,969,897	4.66	1955	Kaiser Steel Corp.[4]
1,581,615	2,318,956	138,185,525	39,540,375	3,200,000	61,098,269	245,984,849	49,643,814	5.52	1954	
None	.....	5,000,000	None	11,060,390	57,038,561	73,098,951	33,401,989	11.2	1955	Sharon Steel Corp.
None	.....	5,850,000	None	11,060,390	51,800,939	68,711,329	34,245,503	4.9	1954	
None	521,470	30,820,447	None	41,029,000	56,998,410	128,847,921	49,185,740	11.30	1955	Crucible Steel Co. of America
276,055	1,403,722	31,389,000	27,605,500	20,544,607	40,555,916	119,995,023	38,920,545	4.35	1954	
241,943	1,308,150	32,337,763	24,194,300	14,411,020	47,454,143	118,397,226	31,699,615	7.64	1955	Pittsburgh Steel Co.
241,943	1,308,150	36,393,239	24,194,300	14,525,692	41,272,681	116,385,912	24,713,170	3.22	1954	
44,700	440,105	34,250,000	4,470,000	25,233,365	38,482,977	102,436,342	33,176,588	14.0	1955	Granite City Steel Co.
121,256	667,475	29,623,266	12,125,600	20,566,605	27,917,502	90,232,973	17,545,037	6.0	1954	
540,000	1,417,500	65,551,000	24,421,150	12,936,072	24,808,306	127,716,528	22,460,702	7.6[9]	1955	McLouth Steel Corp.
540,000	708,750	74,500,000	27,000,000	12,936,072	18,077,464	132,513,536	15,417,820	2.4[9]	1954	
None	.....	1,792,634	None	3,227,700	19,594,852	22,822,552	8,284,403	2.87	1955	Barium Steel Corp.
None	.....	1,347,295	None	3,082,737	19,139,945	22,222,682	4,879,173	*2.0*	1954	
40,572	325,906	30,276,000	4,057,200	1,777,706	85,015,015	121,125,921	48,721,490	13.23	1955	Allegheny Ludlum Steel Corp.
81,345	355,890	32,507,000	8,134,500	1,689,360	70,249,590	112,580,450[12]	36,711,947	4.66[12]	1954	
None	.....	8,734,777	None	4,089,125	16,761,565	29,585,467	9,762,965	15.6	1955	Northwestern Steel & Wire Co.[16]
None	.....	4,906,206	None	4,089,125	13,038,509	22,033,840	910,630	8.5	1954	
None	.....	114,956	None	1,065,491	21,825,964	22,891,455	8,572,082	.04	1955	Newport Steel Corp.[10]
None	.....	222,956	None	1,065,491	20,910,757	21,976,248	7,593,704	...	1954	
None	.....	6,000,000	None	3,179,760	25,154,853	34,334,613	15,516,158	5.9	1955	Lukens Steel Co.
None	.....	6,430,000	None	3,179,760	23,980,073	33,589,833	13,881,718	6.9	1954	
60,000	55,000	28,000,000	6,000,000	3,018,932	33,936,920	85,693,209	23,274,336	9.6	1955	Detroit Steel Corp.
None	.....	35,060,000	None	2,419,017	29,638,293[12]	75,261,485	10,927,018	3.6	1954	
60,173	306,433	5,250,000	6,017,300	6,757,350	17,926,635	35,951,285	8,104,567	7.8	1955	Alan Wood Steel Co.
63,129	315,645	7,000,000	6,312,900	6,560,530	16,774,062	36,647,492	5,425,875	4.7	1954	
82,900	244,553	5,332,000	4,145,000	3,776,090	22,321,806	35,574,896	18,601,781	7.52	1955	Copperweld Steel Co.
84,555	248,093	5,422,000	4,227,750	2,575,940	16,904,424[12]	29,130,114	11,946,456	3.32	1954	
None	.....	75,916,082	None	2,640,000	24,282,207	102,838,289	27,498,575	8.6	1955	Lone Star Steel Co.
None	.....	82,873,245	None	2,640,000	19,523,120	105,036,365	21,751,693	*3.07*	1954	
None	.....	2,999,915	None	4,125,000	17,533,785	24,658,700	14,065,928	16.89	1955	Laclede Steel Co.
None	.....	3,257,366	None	4,125,000	14,724,232	22,106,598	12,130,148	13.89	1954	
None	.....	None	None	2,604,167	28,692,623	31,296,790	13,186,461	28.02	1955	Keystone Steel & Wire Co.
None	.....	None	None	2,604,167	23,674,104	26,278,271	10,506,874	23.27	1954	
None	.....	5,021,000	None	6,967,000	10,993,385	22,981,385	8,192,801	16.9	1955	Rotary Electric Steel Co.
None	.....	3,198,000	None	3,483,500	12,098,211	18,779,711	6,373,712	10.3	1954	
None	.....	2,400,000	None	7,018,798[15]	13,502,295	22,921,084	10,542,829	13.64	1955	Continental Steel Corp.
None	.....	2,600,000	None	7,018,798[15]	11,984,235	21,603,024	9,430,096	9.74	1954	
8,049,003	42,558,637	1,643,932,834	642,561,639	1,985,131,336	4,798,643,146	9,132,827,147	3,189,283,343	11.30	1955	GRAND TOTAL
8,415,502	43,833,092	1,663,086,743	679,849,603	1,902,934,408	4,173,672,366	8,370,211,251	2,664,491,833	7.3	1954	
−4.36	−2.91	−1.2	−5.5	+4.3	+14.9	+9.1	+19.7	+54.8		Percent change 1955 over 1954

des stock dividend of 7½ pct.
sed.
l year ended July 31.
ides 259 shares treasury stock.

15. Less treasury stock.
16. Fiscal year ended Oct. 31.
17. Estimated, based on national operating rate.
18. National rate for industry by AISI.

Italics indicate loss or credit.

STEEL INDUSTRY FINANCIAL ANALYSIS 1955-1954



Rust is a problem anytime, but it's particularly serious with black plate. On this light gauge, dry, uncoated steel, rust can start from a fingerprint. "Sweating" due to sharp temperature changes will cause immediate rusting on surfaces and edges.

Leading mills are now eliminating rust problems by packaging black plate in Ferro-Pak, Cromwell's volatile corrosion inhibitor paper. Chemical vapors from Ferro-Pak form an invisible film around the steel that prevents rust from getting a start, even when moisture is present.

The new Ferro-Pak sheet above was custom-made by Cromwell's "Paper Engineers" to meet steel mill requirements for shipping black plate and dry sheet steel. It is water-proof, strong, yet highly flexible and easy to handle. Its chemical rust inhibitor is non-toxic . . . compatible with oil . . . stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write **Cromwell Paper Company, 4803 South Whipple St., Chicago 32, Illinois.**

FERRO-PAK® by Cromwell

"Paper Engineers"

RUSTPROOFING A FREIGHT CAR. Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.

REPORT TO MANAGEMENT

What Business Is Planning—Now

It was only a few short weeks ago that business appeared to need a little dose of optimism. That isn't the case now. Business executives are making record plans for this year.

And plans for one of the largest expansion programs ever undertaken by industry are backed up by forecasts reflecting improved sales for the rest of the year.

All branches of industry are expecting to increase their capital outlays over last year. Not one industrial division expects to spend less than 10 pct more than in 1955 for new plants and equipment.

If projected plans go through, non-agricultural business will lay out $35 billion for capital improvements this year. This will be $6 billion over 1955.

Much of the expansion may be arbitrarily considered to mean a proportionate increase in productive potential. There have been increases in costs and prices of capital goods, which must be taken into consideration, however.

Backing It Up with Sales

Planned expansion is backed up by sound sales forecasts. All major industry divisions are anticipating higher sales figures this year.

Utilities anticipate the largest increase; 7 pct in electric and 12 pct in gas. Manufacturing firms, both durable and non-durable, expect sales to go up 6 pct while retail and wholesale dealers predict a 4 pct jump.

Single exception in the major manufacturing industries category is, of course, automotive. Detroiters must be getting tired of reading that their slumping auto output is the only weak spot in the economy.

These predictions are not wild guesses. Investment outlay and sales estimates are based on January-March joint survey by the Office of Business Economics-Securities and Exchange Commission.

Let's Look at the Record

The latest batch of "indicators" is solid evidence that things continue to look up.

Index of Industrial Production (adjusted) remains at 143, reflecting almost no change since September.

Personal income was nearly stable from last November, except for an unusually large bulge in December created by year-end bonuses and dividend payments. January's rate of personal income was $312.5 billion, slightly up from the $312 fourth quarter.

Keep an Eye on Scrap

There's nothing to laugh about in the current high price level of steel scrap. That is, unless you made a few dollars by holding onto a respectable tonnage.

This looks like one of the times when scrap may be a real economic barometer. Consider the fact that scrap is reaching for a record high when exporting is about normal, the ore shipping season is just about to get under way, and steel conversion (a big scrap consumer) is not even a factor.

Competition for metals is at an all time high. It is in the direction of basic metals, not so much manufactured products, that the danger of inflation lurks.

Missiles Finally Recognized

Appointment of a czar to supervise the missile program is one of the latest indications that the public didn't get the full story on the Intercontinental Ballistics Missile.

You can look for many more developments now that the Pentagon has been smoked out of either its lethargy or fear of letting public know what's going on.

INDUSTRIAL BRIEFS

No House of Cards . . . A patent has been issued to the Behlen Manufacturing Co., Columbus, Neb., on a frameless metal building which has been successfully tested against an atomic blast. Building construction features deeply corrugated metal panels. Two buildings tested survived atomic explosion, although the closest one located 6,800 ft. from ground zero suffered damage to the roof, sides, doors and windows. The official appraisal declared it to be good protection.

Wire Bounds Up . . . More wirebound shipping boxes and crates were used in 1955 than in any previous year, according to the Wirebound Box Manufacturers Assn. Unit sales totaled 194,986,265 boxes and crates for a dollar volume of $112,162,973, for industry.

Half Dozen . . . Vinson Steel & Aluminum Co., Dallas, Tex., has been appointed the sixth jobber of magnesium tooling plate by The Dow Chemical Co.

Buxom Winch . . . Dual Winch, rated at 90,000 lbs capacity, is being designed and manufactured by Gar Wood Industries, Wayne, Mich., for the Mack Manufacturing Co. It will be mounted on special ten-ton 6 x 6 military Mack truck as the first vehicle developed for tank recovery work since World War II.

Olé . . . The General Electric Co. has been selected by the Spanish government to supply Spain's first atomic reactor. GE's Atomic Power Equipment Dept. will manufacture and supervise installation of a standard G-E 3,000-kw research reactor in the Moncloa area near Madrid for the Junta de Energia Nuclear (Spanish Nuclear Energy Commission).

Academy Award . . . National Carbon Co., Div. of Union Carbide and Carbon Corp., has been awarded an "Oscar" by the Academy of Motion Picture Arts and Sciences for its contribution to the art of studio lighting. The famous bronze statuette—the only one presented this year for scientific and technical achievement—was in recognition of National Carbon's development and production of the yellow flame carbon for motion picture color photography.

Rough Deal . . . Norton Co., Worcester, Mass., abrasive manufacturer, has acquired controlling interest in a sandpaper plant located in downtown Buenos Aires, Argentina. Purchase was made to put Norton "into the Argentinian market which had been closed to us during the Peron regime."

"Its my own fault for always begging for a desk job."

Atomic Planning . . . General Atomic Div., General Dynamics, has retained Pereira & Luckman for preliminary master planning of the Torrey Pines atomic laboratory site. Laboratory will undertake basic research and development work, with particular emphasis in the nuclear field, concentrating initially on research leading to the development of more efficient nuclear reactor systems.

Takes Gas . . . U. S. Steel Corp., Pittsburgh, has awarded a contract to The Gas Machinery Co., Cleveland, to install a gas-fired bar heating furnace at the Johnstown Works.

Charge It . . . Exide Industrial Div., The Electric Storage Battery Co., has initiated a program whereby purchasers of electric industrial trucks now may lease batteries and chargers for periods up to five years with one of several Exide leasing and purchase option agreements. The effect is aimed at bringing average initial outlay for electric trucks within range of the original cost of trucks powered by other means.

Pontiac Production . . . Frostrode Div., Warren Alloy, has completed transfer of its manufacturing machinery to new and expanded quarters in Pontiac, Mich. New plant has three complete production lines for the construction of its cooling units which are used for chilling for machine tools, solvent stabilizing in dry cleaning plants and air conditioning in homes.

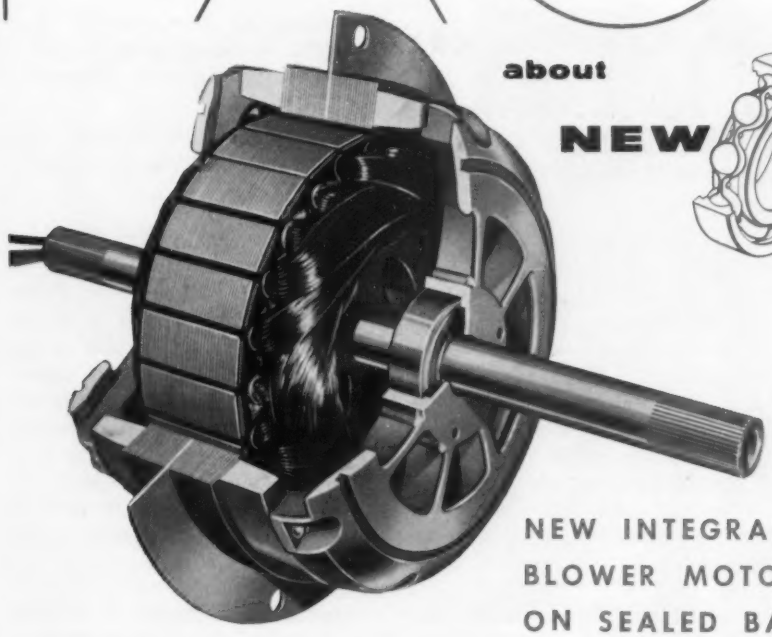
Nutmeg Warehouse . . . Nielsen Hydraulic Equipment, Inc., has recently opened a warehouse in West Hartford, Conn., carrying stocks of Parker tube fittings, tube-working tools and synthetic rubber O-rings for sealing applications.

FACTS

about

NEW DEPARTURE

BALL BEARINGS



NEW INTEGRAL-DRIVE BLOWER MOTOR DEPENDS ON SEALED BALL BEARINGS!

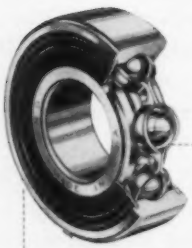
Nowhere is the superiority of New Departure sealed ball bearings in electric motor applications better exemplified than in this new integral-drive blower motor.

Revolutionary "inside-out" design of this new motor imposed a lubrication problem solved by the permanent-lubrication characteristic of the finest sealed ball bearings. In this motor, the rotating element, to which the blower wheel is attached, is on the outside and revolves around a stationary shaft through which the lead wires pass. "Sealed and lubricated-for-life" New Departure ball bearings were selected because they assure permanent lubrication, regardless of centrifugal force. Also, because motor and blower wheel share the same permanently lubricated bearings, this integral unit is free of the need for periodic servicing.

Equally important, New Departure sealed ball bearings handle combination loads in any position . . . assure positive alignment of rotor and stator. This means a versatility of application for this motor that offers new freedom to designers.

Sealed ball bearings also help increase motor efficiency and reduce electrical hum. Since in ball bearings wear is so slight as to be entirely negligible, designers were able to build in a smaller precision air gap, which is maintained throughout motor life.

Let New Departure's unexcelled engineering service show you the many advantages of sealed ball bearings in electric motor and other applications.



5 advantages of New Departure's Sentri-Seal ball bearings in electric motor applications

- **SEALED AND LUBRICATED FOR LIFE!** No need for relubrication; no danger of over- or under-lubrication.
- **SIMPLIFY DESIGN!** Eliminate need for separate seals and grease fittings.
- **CARRY LOADS IN ANY POSITION!** Moving parts are held in positive alignment, regardless of motor mounting position.
- **WEAR IS NEGLIGIBLE!** Require no attention for adjustment for wear. Have a reputation for outlasting the products they serve.
- **QUIET-RUNNING!** New Departure ball bearings are precision-made, run smoothly. Their uniformity is a guarantee of dependability.

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

Packard Aiming For New Market

New Packard series to be introduced next week . . . Called the Executive, it will compete in middle luxury market . . . Considered possible new trend for Independents—By *T. L. Carry.*

◆ FINANCIAL position of the Independent producers in the automobile industry is not as solid as it might be.

Year-end statements of American Motors and Studebaker-Packard Corp. indicate that both companies have a struggle on their hands to meet the increasing competition.

But the battle is far from being lost.

Latest maneuver in the scramble for a bigger share of the customer's dollar is the introduction of a new series of cars by Packard.

The new line, called the Executive series, will go on display at Packard dealerships next week. It is priced between the Clipper and Packard models, about $4200.

Production Problems . . . The Executive has been in the works for the last 2 years. Its introduction hinged on successful accomplishment of a number of things; major changes in operating facilities, product development and manufacturing costs.

Actually, the division had to develop its industrial strength before it could develop any new products.

There are several factors involved in the decision to introduce the car. Statistics show, according to Packard, that 357,000 luxury class cars were sold last year. Of that total, 46 pct were in the same price range as the new Executive.

Big Market . . . So far this year, Packard estimates that over 50 pct of the luxury cars sold are in this price range. Packard is out to get a share of this market.

The car will compete specifically with lower priced Cadillacs, Lincolns and Chryslers. Previously, Packard was only able to compete with the upper and lower fringes of the luxury market. The new car is aimed at the middle, and the company hopes it will be able to hit the target.

The Executive has a 122 in. wheelbase and is powered by a 275 hp V-8 engine with a 9.5 to 1 compression ratio.

Late Introduction . . . The timing of the introduction of the car is significant.

According to Robert P. Laughna, division general manager, original plans called for introduction of the Executive along with Packard's other 1957 models later this year. The date was moved up because the modernizing of manufacturing facilities progressed much more rapidly than expected.

As a matter of conjecture, it is also possible that Packard is developing a new trend in product development for smaller companies.

Independent Trend . . . Keeping the public's attention is not easy for a small company that doesn't have the advertising budget of its

Will Detroit Bet on a Steel Strike?

◆ AUTOMAKERS are cagily playing their steel buying against the possibility of a steel strike later on this year.

But that's about the extent of strike hedging. They aren't going so far as to build up any tremendous backlog of unsold cars. That's dangerously high already without gambling on another industry's labor problems.

Here's the situation:

Since the cutbacks in January, auto production is running at a rate of about 133,000 cars a week. Nobody looks for the rate to increase more than about two pct because of the high dealer inventory level.

At the same time, with the exception of some minor cancellations, most auto producers have been taking steel in at a steady rate. It's no secret that the object is to build up inventories.

As a result, most automakers now have an average inventory of 30 to 45 days. In some cases, it is even higher.

So if there is a strike, producers will have almost enough steel to last through the end of the 1956 model run, if production stays at current levels. If there isn't a strike, it means some mild cutbacks in steel buying from Detroit.

But look out for 1957. Steel buying for next year's cars is expected to start in August. Word is that the industry is planning big things, not only the changes in the works, but also big plans for production and sales.

Plants improve plating operations with unique chromium process

♦ Operating costs cut, production stepped up by Unichrome SRHS® Chromium Plating Process

♦ Better plate also reported . . . many hundreds of plants now profiting

For years, many platers have had good opportunities to check results from ordinary chromium baths and from Unichrome SRHS Chromium. Here are just a few typical comparisons.

REJECTS MINIMIZED

At one company, intricate parts caused chromium plating coverage difficulties. On occasion, rejects due to the plate "missing" ran as high as 25%. Yet with SRHS Chromium and its wider bright plating range, work covered easily, with a reject rate under 0.4%. Foreman at another plant told of reducing rejects due to "burning" of the plate and eliminating color-buffing when the SRHS Bath was installed.

PRODUCTION BOOSTED

Unichrome SRHS Solutions increase plating speed. Work which took 3½ hours in ordinary chromium was done with SRHS in 2½ at one shop. Elsewhere, piston rings are being plated in half the former time.

Taking advantage of the higher efficiency of SRHS Chromium, some plants have obtained 30 to 66% more work per *cycle* from existing equipment, and saved power as well.

This process is just one of Metal & Thermit's many Unichrome processes and materials which provide opportunities to cut your finishing costs . . . opportunities to turn out a better product through a better finish. We'd welcome the chance to work with you.

Unichrome is a trade mark of Metal & Thermit.

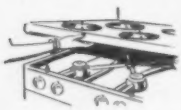
PLATING MATERIALS
ORGANIC COATINGS
TIN & TIN CHEMICALS
CERAMIC MATERIALS
RADIOGRAPHIC EQUIPMENT
WELDING SUPPLIES
METALS & ALLOYS
HEAVY MELTING SCRAP

UNICHROME

METAL & THERMIT
CORPORATION

100 EAST 42ND STREET, NEW YORK 17, N. Y.
Pittsburgh • Atlanta • Detroit • East Chicago • Los Angeles
In Canada: Metal & Thermit–United Chromium of Canada, Limited, Toronto

Blind attachments made at 82% lower cost ...with Tinnerman SPEED CLIPS®!



Automatic Range Company, Brooklyn, cut assembly costs on its Royal Rose Ranges 82% with a Tinnerman tubular-type SPEED CLIP®. It locks the removable range tops securely in place. Automatic Range designers were able to eliminate a costly bracket, a wire form catch and a spot welding operation with this engineered fastener.

One-piece, spring-steel SPEED CLIPS are quickly and easily snapped into punched holes in the range's top. Self-retained, the SPEED CLIP grips the mating stud in the front panel flange with pin-point accuracy under live spring tension for a firm, vibration-proof attachment. Yet the top is readily raised or removed for cleaning or servicing . . . no tools required!

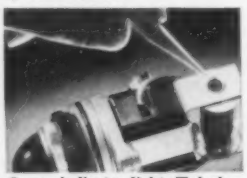
Tinnerman produces more than 8,000 different types and sizes of SPEED NUT brand fasteners. They are designed to help you make faster, easier, more efficient attachments at substantial assembly savings. Consult your Tinnerman representative for complete information on standard or specially engineered SPEED NUTS. Also write for your copy of "SPEED NUT Savings Stories."

TINNERMAN PRODUCTS, INC. • BOX 6688, DEPT. 12, CLEVELAND 1, OHIO

Canada: Dominion Fasteners, Limited, Hamilton, Ontario. *Great Britain:* Simmonds Aerocessories, Limited, Treforest, Wales. *France:* Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine). *Germany:* Hans Sickinger GmbH "MECANO", Lemgo-i-Lippe.

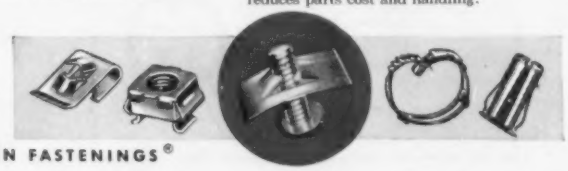
In a heating-unit assembly, "J" type SPEED NUTS eliminate problems of hole misalignment and paint clogging.

On truck radiators, costly retapping of flash-clogged threads of weld-type fasteners is eliminated by SPEED GRIPS.



On an indicator light, Tubular SPEED CLIP replaces 4 parts, reduces parts cost and handling.

TINNERMAN
Speed Nuts
FASTEST THING IN FASTENINGS®



Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
MARCH 31, 1956	136,202	25,581
MARCH 24, 1956	141,373	26,146
APRIL 2, 1955	187,418	31,019
MARCH 26, 1955	187,993	29,354

*Estimated. Source: *Ward's Reports*

competitors. Bringing out a new series of cars after regular models have been introduced is one way of getting publicity. People are always interested in new automobiles.

This method is particularly suited to the smaller firms. In the first place, it doesn't tax the advertising budget too much. Secondly, small companies are flexible enough in their operations to produce another car without too much of a strain on manufacturing facilities.

Motorama Drops N. Y.

Current opinion in Detroit is that GM's 1957 Motorama will not be held in New York because of the revival of the National Automobile Show. The show, out of circulation since 1940, is scheduled for New York's new Coliseum, Dec. 8 through Dec. 16, 1956.

Inasmuch as General Motors will participate in the industry-wide venture, it is believed that the corporation will still hold its Motorama next year but will substitute the National Show for the regular Motorama opening in New York because of the proximity of the dates for the two shows.

Revival of the National Automobile Show, under the guidance of the Automobile Manufacturers Assn., marks the return of a 40-year tradition to the industry. All producers are expected to participate.

According to AMA, the show has not been held since World War II because of the lack of sufficient space for the exhibits. Completion of the Coliseum in New York this year solves that problem.

William J. Cronin, managing director of AMA, says the industry also realizes that it has been missing a good bet by not having the show every year. There is no doubt that the show would be a great asset to producers and help focus the country's attention on the industry's products.

But it must also be remembered that the recent anti-trust rumblings from Washington have not gone unheeded, even though they have been called "nonsense."

The show will give the Independents a chance to display their wares on a more equal basis with the Big Three in a glamorous setting that the smaller companies could not otherwise afford. It could have the effect of quieting the talk of anti-trust action.

Gas Turbine Research

Chrysler's gas turbine engine just completed a cross-country run in a Plymouth automobile. It is still a long way from being mass produced on a regular commercial basis.

The cross-country junket, first for any gas turbine car, was conducted to find out how the engine would operate under all normal driving conditions.

AUTOMOTIVE NEWS

A great deal of progress has been made on the engine since Chrysler first announced its development 2 years ago.

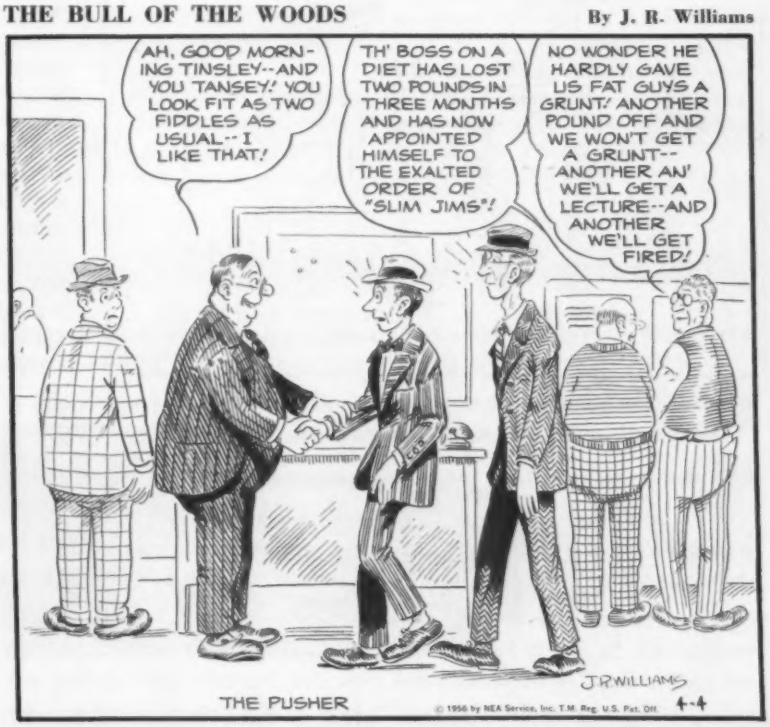
But there are still reasons why commercial production is still a long way off. Among the most important problems facing turbine engineers is the development of less expensive, non-strategic materials for engine parts subject to intense heat, such as turbine wheels and blades.

Also, Chrysler admits that many refinements in manufacturing techniques will have to be developed.

There is another factor involved —the present piston engine.

There are improvements being made today that can be introduced in the future on the piston engine. But some engineers believe that, if the gas turbine does not prove itself as the successor to the piston engine within the next decade, the automobile industry will discard it and turn to some other source of power.

THE BULL OF THE WOODS By J. R. Williams


AH, GOOD MORNING TINSLEY--AND YOU TANSEY! YOU LOOK FIT AS TWO FIDDLES AS USUAL--I LIKE THAT!
TH' BOSS ON A DIET HAS LOST TWO POUNDS IN THREE MONTHS AND HAS NOW APPOINTED HIMSELF TO THE EXALTED ORDER OF "SLIM JIMS"!
NO WONDER HE HARDLY GAVE US FAT GUYS A GRUNT! ANOTHER POUND OFF AND WE WON'T GET A GRUNT--ANOTHER AN' WE'LL GET A LECTURE--AND ANOTHER WE'LL GET FIRED!
J.R.WILLIAMS
THE PUSHER
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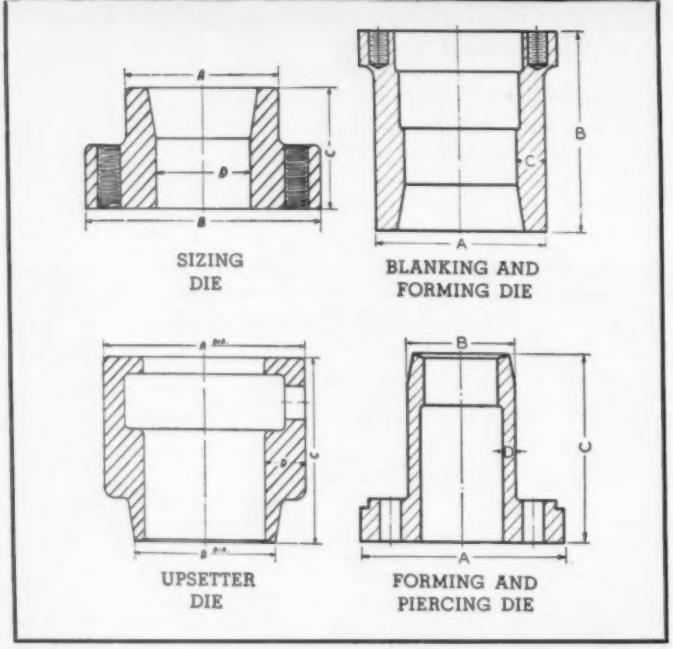
SPEED PRODUCTION, CUT WASTE WHEN MAKING RING-SHAPED TOOL STEEL PARTS



New Graph-Mo® Hollow-Bar eliminates drilling, machines 30% faster

IF you make ring-shaped tool steel parts, you'll find that you can speed production, cut waste, and save steel by using Graph-Mo® Hollow-Bar. That's because Graph-Mo Hollow-Bar comes with the hole already in it. There's no drilling. You start with finish boring.

And with Graph-Mo Hollow-Bar you get the combination of proved advantages that have made Graph-Mo one of the most popular tool steels: excellent machinability, exceptional wearability, unsurpassed stability.

Actual tests prove that Graph-Mo machines 30% faster than other tool steels. That's because Graph-Mo has free graphite in its structure. And this free graphite gives Graph-Mo less tendency to pick up, scuff, and gall.

Graph-Mo's amazing wear resistance stems from a combination of graphite and diamond-hard carbides. Reports from users indicate that Graph-Mo outwears other tool steels on an average of three to one.

Graph-Mo also is the most stable tool steel ever made. A master plug gage made from this steel showed less than ten millionths of an inch dimensional change after 12 years in use. And Graph-Mo responds uniformly to heat treatment, too.

Makers of ring-shaped tool steel parts may obtain Graph-Mo Hollow-Bar in sizes from 4 to 16 inches O.D. with various wall thicknesses.

To learn more about Graph-Mo Hollow-Bar, and its application to your problems, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

Higher Costs Threaten Balanced Budget

Government finds climbing prices and other added costs mean spurt in government spending . . . But tax collections should exceed spending for fiscal year . . . Congress wants AEC information—By G. H. Baker.

◆ TENDENCY OF PRICES to nudge upward this year is to be further strengthened in the weeks ahead by a spurt in government spending.

Government, like industry, is finding that the price of nearly everything it buys is creeping up.

Higher prices for metals mean revised price-tags on the planes, ships, and guns the Defense Dept. buys.

Farm price-support payments are rising.

Foreign aid, under the new Eisenhower plan before Congress, is to cost twice as much as last year.

The sum of all these individual cost advances is worrying Treasury Secretary George M. Humphrey. He has estimated total government spending for the new fiscal year at $65.9 billion.

Tax collections will exceed this figure somewhat, thus assuring a balanced budget, plus a little money left over to retire part of the national debt.

But if creeping inflation is to add several hundred million dollars extra to the cost of running the government, then the likelihood of a continued balanced budget and perhaps some tax reductions becomes only a very remote possibility.

New Missile Czar

Tangled lines of authority hampering the U. S. guided missiles production program are to be straightened out by E. V. Murphree, new special assistant to Defense Secretary Wilson.

On leave from his job as president of Esso Research and Engineering Co., Mr. Murphree takes on the difficult task of guiding research, development, engineering, and output of all new-type missiles. He will give his principal attention to long-range (5,000-mile) ballistics weapons.

The new Pentagon official steps into a highly exposed position because of criticism expressed by certain members of Congress concerning an alleged lack of speed in completion of missiles which can be fired at intermediate and long ranges. But he is described by Secretary Wilson as the possessor of all the skills and experience needed to handle this special work.

Mr. Murphree will be chairman of the ballistics missiles committee, Office of the Defense Secretary. He will have considerable authority of his own and is promised the backing of Secretary Wilson in resolving interservice squabbles.

He is a former chemical engineer with the Solvay Process Co., in Syracuse, N. Y. In 1930, he joined the Standard Oil Co. of Louisiana, transferring in 1934 to the position of development and research manager, Standard Oil Development Co. This firm became the Esso Research and Engineering Co.

Local Problem

Chronic unemployment in the so-called "distressed" areas is essentially a local problem, as the Eisenhower Administration sees it. One of the Administration's top labor experts is emphasizing the position in congressional conferences currently being held.

Small Business Gets the Business (Government)

Current fiscal year figures show small companies are getting more opportunity to take on government prime contracts.

In eight months ended Feb. 29, proposed orders for more then $260 million were reserved for competitive award to little companies.

Dollar value of gain over corresponding 1955 is more than $18 million.

Actual contract awards to small firms reached $198.3 million during that period. SBA helped arrange prime and subcontract opportunities for 64,322 firms.

Recent SBA arrangements with GSA, VA, and Dept. of Agriculture are just getting started. But they have resulted in earmarking for small companies more than $3.5 million in proposed purchases.

A translator? The bridge between immediate need and service satisfaction? In any case, he most often is the practical means to solution of plant problems.

What kind of tubing? Random, multiple or cut lengths? Seamless or welded? How about cost, delivery, specifications? These are but a few of the many questions that he must consider to meet his organization's production and fiscal needs. One of his more valuable functions is knowing whom to call on when confronted with a buying problem.

Many practiced P.A.'s, through long experience, find that the facilities of B&W very often satisfy the needs that confront them constantly. They enlist the aid of Mr. Tubes, their link to B&W.

If you don't know Mr. Tubes, maybe the time has come for you to meet him. Call on Mr. Tubes. He can be a big help to you. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

Seamless and welded tubular products, seamless welding fittings and flanges—in carbon, alloy and stainless steels

Getting a "distressed" area back on its economic feet is a problem best understood and best executed by management, labor, and the public in the affected areas. Little if any good is accomplished by setting up a new Washington bureau to "administer" the problem, Ike's men point out. (You can't solve a local problem by appointing more bureaucrats hundreds of miles removed from the scene of trouble.)

Under Secretary of Labor Arthur Larson is highly critical of the legislative approach advanced by Senator Douglas, D., Ill., who wants to create a new federal agency to appoint "industrial development committees." If anybody's going to appoint committees, raps out Mr. Larson, it should be the folks in the affected area. "The only way this program can be made really effective is through local initiative," he declares.

Three guides to government assistance, as laid down by Ike:

1. Emphasize lasting improvement, not just a brief flurry of help.
2. Let local people take the lead in directing assistance.
3. Federal aid should be channeled through local authorities, not superimposed upon state and local programs.

Business Censuses

The U. S. Census Bureau is nearing the end of the first phase of publication of results from the 1954 censuses of business, and will soon begin tabulating preliminary national summaries.

In the census of manufactures, advance industry reports covering general statistics on employment, costs, and production have been coming out since the first of the year. Beginning in April, national summaries totaling general statistics for the country as a whole, by each state, and value of shipments for 1,000 classes of products, will be published.

In June, the Bureau will begin totaling up industry statistics for almost 500 industries—including metal working operations, by industry—giving detailed statistics on costs, on employment, and production nationally and by states with historical comparisons. Detailed state figures will be published in the final quarter of the year, to be followed finally by detailed subject reports for each of the major industry classifications — employment, production, materials consumed, etc.

In the census of mineral industries, preliminary reports for 35 industries are now being released, and will be completed in June, when a national summary will be published. Separate bulletins for 29 industries giving detailed statistics with historical comparisons will be ready this summer, and state figures will be published late in the year.

Discounts:

Businessmen urge FTC to clarify limits.

Federal Trade Commission should set up cost-accounting guides and take other measures to clarify the highly-complicated and disputed cost provisions of the Robinson-Patman Act that limit business discounts, a committee of businessmen recommends.

The cost provisions, clouded by almost 20 years of conflicting decisions by courts and the FTC itself, permit different prices to different buyers as long as the differentials "make only due allowance for differences in the cost of manufacture, sale or delivery resulting from the differing methods or quantities" in which commodities are sold or delivered to buyers.

Many Complications

A defendant in such a case must be able to prove that his discounts are justified by lower costs. But this calls for complicated cost accounting. In the past 19 years, only two cases under the act have been successfully defended on cost grounds alone.

As a result of the confusion surrounding the cost provision, a seven-man advisory committee set up by FTC in 1954 urges that the agency establish cost accounting guides and administrative procedures to ease the burden on businessmen.

The panel specifically urges FTC to:

Make its accounting staff available for consultation with businessmen charged with price discrimination to eliminate unnecessary studies;

Appoint an advisor to prepare continued cost accounting opinions to guide businessmen;

Accept cost accounting and analysis results as "reasonable approaches to accuracy" and not as precise measurements since cost accounting is not an exact science.

BDSA Recruits Business Reserve

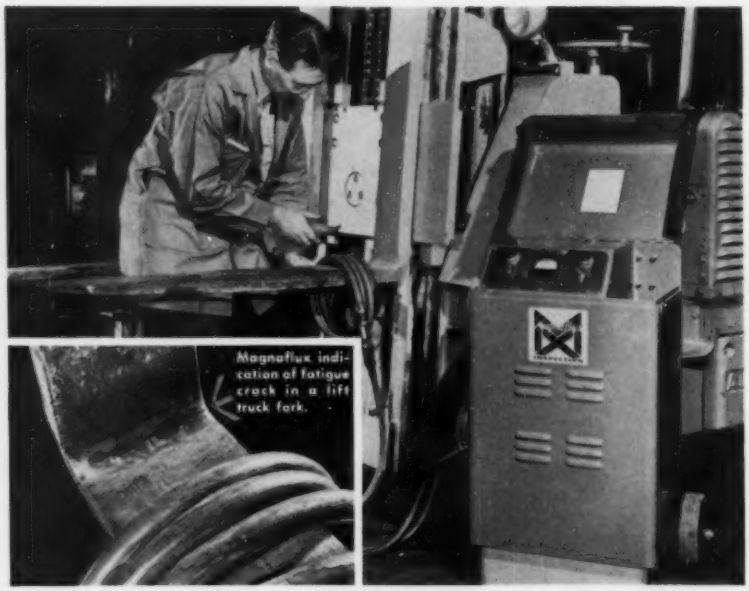
◆ BUSINESS and Defense Services Administration is seeking experienced industry executives and technical experts to learn government operations and help run the country in case of an emergency.

BDSA thus becomes the first government agency to begin its drive for reservists under the new executive reserve program authorized recently by President Eisenhower and approved by Congress.

The Administration's program calls far top executives, technical personnel, and other businessmen to be recruited for service in the reserve. Each agency will train its own reserves, bringing them to Washington for several weeks once a year and providing them continuously with up-to-date information on their ageny's mobilization plans and programs. In case of an emergency, they would be "drafted" to Washington to run government programs and help a mobilization effort.

Case Studies:
NONDESTRUCTIVE TESTING SYSTEMS

THE ELECTRIC DETECTIVE is an apt description of the Magnatest FM-100 Conductivity Meter. Magnatest uses the electrical conductivities of materials as a measure of uniformity, hardness, purity and other characteristics. A small hand held coil induces eddy currents in the test material, which in turn affect the impedence of the coil in proportion to the conductivity of the material.



How Periodic Inspection Ups Production by Preventing Equipment Failures

When industrial equipment fails in use, it usually results in lost time, production, or even life! In each case there is a corresponding loss of money. The amount, of course, depends upon the circumstances. Periodic inspection with an M testing system can foretell the exact nature and extent of structural weaknesses in your machinery, tanks, or equipment.

Invisible hairline cracks are warning signs of future fatigue failure. The M tests detect such signs in any material. You can take the proper corrective steps in time to prevent costly production interruptions. Nondestructive testing can help you eliminate profit-draining equipment failures. —Investigate Magnaflux inspection methods today!

IT'S JUST A LITTLE CRACK, but it's a serious matter when it shows up on an industrial crane hook. In fact, to the naked eye it may appear to be a scratch, at most. Yet it can open further and further under load. The end result: failure in service and subsequent costly damage. Photo above shows a Magnaflux indication of such a crack in a crane hook.

ZYGLO "SPOTLIGHTS" SERIOUS DEFECTS IN CUTTING TOOLS

Zyglo inspection employs an oil base penetrant that is brilliantly flourescent under "black light". It detects surface cracks or pores when they may affect the service life of any metal part. Whether you produce cutting tools, or use them, Zyglo provides better inspection at lower cost.

THE HALLMARK OF THE BEST SYSTEMS FOR NONDESTRUCTIVE TESTING

MAGNAFLUX CORPORATION

Write for complete details concerning any of the above case studies, or ask for our new booklet on "Lower Manufacturing Costs."

Take Your Inspection Problems to the House of Answers

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New York 36 • Pittsburgh 36 • Cleveland 15 • Detroit 11 • Dallas 19 • Los Angeles 58

West's Share of Auto Spending Mounts

Industry will get benefit of $500 million a year spending by 1958 . . . Plants increase Coast production capacity . . . Area's industry can get a bigger share if it works at it—By *R. R. Kay.*

◆ A HALF - BILLION dollars! That's what automakers, by 1958, will shell out per year on the West Coast for parts and supplies for their California-assembled cars and trucks. This swelling market, unfortunately, is being overlooked by some.

A look under latest plans shows:

(1) A new General Motors Buick-Oldsmobile-Pontiac plant is starting up in the San Francisco Bay Area. Peak production: 100,000 cars per year. GM will start with its 1958 models. The 1.5-million-sq-ft plant in full production will employ 5000.

(2) Ford Motor Co. broke ground for its new $40 million Mercury plant in the Los Angeles area — Mercury's second largest U. S. unit. They, too, will turn out 1958 models. This plant, with a 175,000-car-per-year peak, will replace the present 70,000-car Los Angeles facility. There'll be jobs for 3100.

(3) And the new Ford factory at Milpitas (San Francisco Bay Area) is rolling along with a 150,000-unit-per-year capacity. This 1.5-million-sq-ft plant hires 2500 now.

Growing Market

These three plants will create a new $100 million market. That's on top of the $300 million per year Chrysler, Ford, and General Motors are now spending in the West.

And automakers say that they'll increase their buying on the West Coast if they can get quality products at competitive prices. Every year this area has to bring in one million tons of parts because it fabricates only 40,000 tons!

Big question: Will the present West Coast suppliers increase their facilities to get a big piece of the new business? Or will more eastern manufacturers set up shop here?

Some tips for suppliers:

(1) Make a saleable product. (2) Price it competitively. (3) Consistently produce called-for quality. (4) Be financially sound. (5) Spot your plant in a strategic location. (6) Have top sales and service representatives.

More major planemakers and unions signed on the dotted line. It means two years of labor peace for the companies and for most of southern California's 180,000 unionized aircraft and guided missiles workers. Agreements by Douglas Aircraft Co., North American Aviation, Inc., and Northrup Aircraft, Inc., follow the pattern set by Lockheed Aircraft Co. (See THE IRON AGE, West Coast Report, Mar. 22, 1956, p. 61.)

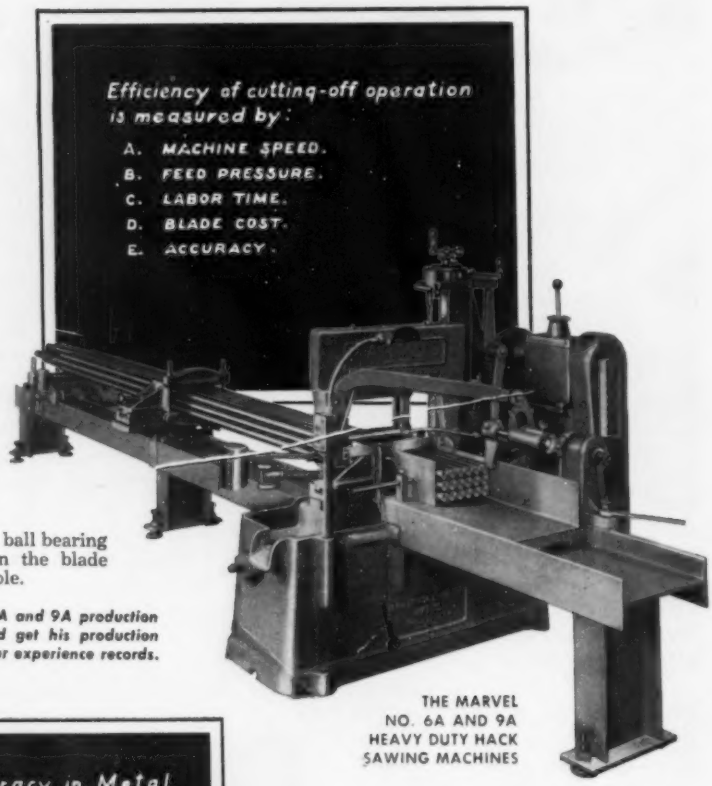
The Atomic Energy Commission plans to reopen its zirconium production plant in Albany, Oregon.

Construction of the natural gas pipeline into the Seattle area is ahead of schedule, according to C. R. Williams, president, Pacific Northwest Pipeline Corp. Target date for completion is October 1.

PNEUMATIC reciprocating jig saws have replaced band and hand hack saws for trimming plastic tools at Convair Div., General Dynamics Corp., San Diego, Calif. Company considers quality better, estimates speed increased 12 times with annual saving in production costs of about $10,000.

Efficiency in Cutting-off is Important

Practically all machining operations start with pieces cut-off from bars or billets. Hence, inefficiency, or lack of capacity, in the cut-off department can hold up or stagnate the entire plant.



THE MARVEL NO. 6A AND 9A HEAVY DUTY HACK SAWING MACHINES

A. Are all-ball-bearing and provide a quick return; therefore they run FASTER than others on the same work.

B. Can apply as much as 1200 pounds feed pressure—two to ten times as much as other hack saws and band saws.

C. Are fully automatic, requiring no more operator attention than an automatic screw machine; and set-up for any bar size and cut-off length is extremely simple.

D. Use a non-breakable high speed hack saw blade — the type of saw blade that produces the greatest number of square inches of metal cut per dollar of blade cost—two to ten times (or more) as much as any band saw.

E. Because of their exceptional sturdiness, ball bearing reciprocating frame, ability to tension the blade "truly taut", their accuracy is dependable.

If you are not using modern, improved MARVEL NO. 6A and 9A production hack saws, call the local MARVEL Field Engineer and get his production and cost estimates on your work—to compare with your experience records.

Formula for Accuracy in Metal Sawing:
ACCURACY = (Length, Straightness, Squareness)
(Straightness, Squareness) = (Blade Rigidity, Blade Tautness)
MARVEL
HIGH-SPEED EDGE
ARMSTRONG BLUM MFG. CO.
CHICAGO ZZ MADE IN U.S.A.

Write for catalog C-55—showing and describing eleven different series of Metal-Cutting Sawing Machines and MARVEL-High-Speed-Edge Hack Saw Blades and Hole Saws.

The composite MARVEL High-Speed-Edge Hack Saw Blade—cuts **any** machinable material efficiently. There is no time lost changing blades for different types of steel; no time lost replacing shattered blades, because MARVEL High-Speed-Edge Hack Saw Blades are positively **unbreakable.** These superior blades have the finest high speed steel cutting edge welded to a strong alloy steel body. They will stand-up under the highest speeds and heaviest feeds attainable on any make hack saw. Can be safely tensioned tauter than any other blade—cut-off not only straight but also square and with less stock loss.

MARVEL Metal Cutting SAWS
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

Order Drop Is No Surprise to Builders

Slump in new cutting tool orders below $100 million mark first in five months . . . Realistic builders realized that volume could not last forever . . . Builders hear Air Force position—*By E. J. Egan, Jr.*

◆ NEW ORDERS for metal cutting machine tools dipped below the $100 million mark in February for the first time in five months. Estimated total for the period was $86 million, compared with $115.2 million in January, and $61.9 million in February, 1955.

Shipments for the same segment of the industry are estimated at $64.6 million in February. This represents a gain of $10 million over the January total and about $14.8 million better than the February, 1955, figure. Current backlog of unfilled orders stretches out to about 8.5 months.

The drop in February's new order rate was not altogether unexpected. Builders have been pleased at the sales gains recorded since last September's machine tool show, but they were realistic enough to predict that monthly volume in excess of $100 million could not keep up forever.

Background . . . Factors underlying the industry's new order dips and rises were a major program topic at last week's spring meeting of the National Machine Tool Builders Association. Assembled in Houston, Texas, industry leaders heard that too much of their product is going into new or expanded metalworking programs.

Association president Louis Polk, who is also president of the Sheffield Corp., Dayton, Ohio, told his audience that they must learn to sell the "function" of machine tools in the national economy, as well as selling machines. "Our job," he said, "is to keep America's plants modernized, properly productive, and capable of operating at maximum economy."

Mr. Polk's message struck at the core of the industry's biggest problem: how to convince metalworking management that it is financially advantageous to replace inefficient machine tools with up to date units.

Reach the Top . . . He outlined two reasons why builders should intensify their efforts to communicate with upper echelon executives in language that will bring replacement sales.

One reason is primarily good for the individual customer or prospect. As Polk said, "Let's talk to top management about the imperative need for greater mechanization or automation in a competitive economy faced by a widespread labor shortage in the years ahead."

His second reason is concerned with the defense position of the U. S. "All of us know how the failure to replace old machine tools and order new ones in time for any emergency may threaten our whole military preparedness program," he said.

Defense Angle . . . From the military side, builders were pleased to hear that the Air Force is aware of its responsibility to keep its weapons and the machine tools that make them up to date.

Dudley C. Sharp, assistant Air Force secretary, said that future weapons will continue to utilize more of those metals and alloys that cannot be formed efficiently on old metalworking equipment. He urged builders to bring news of any and all machine tool improvements to the attention of Air Force officials.

Mr. Sharp said that of the total Air Force inventory of 145,000 machine tools, only 2 pct are more than fifteen years old. Thirty-eight pct are in the ten to fifteen year ago group, three pct are from five to ten years old and 57 pct have been purchased within the past five years. Air Force plans call for replacing 4,500 over-age units within the next year.

Active Lines . . . Mr. Sharp did not refer directly to the "Vance plan," which in the opinion of many builders, was "scuttled" by the Defense Department and the Office of Defense Mobilization in January. He did say, however, that the Air Force did intend to keep channeling newly purchased equipment into currently active production lines.

Builders generally agree that equipment should be used while it is still new, but they are still concerned that this practice might lead to reserve depletion.

Machine Tools, 1956

(Metal Cutting Types Only)

January New Order Index	399.2
January Shipment Index	191.9
February New Order Index	290.8*
February Shipment Index	218.4*

(*Tentative)

"Steel from the Furnaces." Agnes Potter Lowrie depicts some of the basic steel products which provide the sinews of American industry. The I-beam, key piece in building construction. The angle iron. Wire rope. Railway track to carry the carriers of industry. The can, universal container for foods and liquids. And in the background, sheet steel, gleaming symbol of strength and durability.

The Fine Art of Steel Making

Too often, estimates of the steel industry concentrate upon our overwhelming productive capacity. Yet more than a little credit is due another American talent—the ingenuity of research coupled with the ever-readiness of steelmen to adopt new and better products and processes.

As recently as World War II, some of our largest mills were fearful of shutdowns because palm oil, then considered the essential lubricant for cold rolling tin plate, was obtainable only from foreign sources and had to be imported across U-boat-infested waters.

Research tackled the problem. Three years ago Ironsides announced Palmoshield as the first domestic replacement for imported palm oil. Within six months two-thirds of our major tin plate mills were using or testing it, often with remarkable results. For example, one company stepped up production 15% with no additional investment, no increase in labor, and no change in mill operation.

Recognized as today's most significant advance in lubrication, Palmoshield offers five distinct advantages:

1. Produced in the heart of the steel industry. Users need not stockpile.

2. Made from freely available domestic materials.

3. Subject to exact chemical control — free fatty acid content to within ½%.

4. Price is not artificial, but fluctuates freely with the domestic fat market.

5. Proved in production to deliver increased tonnage at less cost.

Ironsides research, which developed Palmoshield, is geared to the future. A flexible team — the "custom tailors" of lubrication — Ironsides engineers are available for technical assistance on special problems of any nature or size.

A letter will summon them without obligation. Address The Ironsides Company, Columbus 16, Ohio.

SHIELD PRODUCTS

Ironsides

By the makers of Palmoshield • "the palm tree that grows in Ohio"

The Iron Age SALUTES

Nathanael V. Davis

Heads world's second largest aluminum producer at age 40. Official office is in Boston, but working office is his briefcase. Masterminded biggest aluminum expansion yet.

"As long as water flows downhill, there will be power for aluminum in Canada."

But it takes more than natural resources. It takes men—young, active and farsighted—like Nathanael Vining Davis, who at 40 years of age is president of Aluminium Ltd.

Nathanael Davis was literally born into the aluminum industry. His father, Edward Kirk Davis, was president of Aluminium Ltd. from its inception in 1928 to his retirement in 1947. But one can't administer a corporate giant on the reputation of antecedents.

Young Mr. Davis began his formal studies at the Universities of Grenoble and Tours in France and finished up with a year at the London School of Economics. In between, he graduated from Harvard with honors.

It was during the initial European courses that the budding executive received his baptism of fire in aluminum production. There he tended a smelting furnace for Aluminium Ltd.'s Italian subsidiary during summer.

In 1946 he joined Stand Ltd., English management company of Aluminium Ltd. in the top executive capacity. The following year he was called home to take the reins from his father. He was 32 years old.

Under the younger Davis' leadership the Canadian company constructed the world's largest aluminum smelter, began the well-known Kitimat smelter-hydroelectric project and currently is looking into African Gold Coast.

Two particular precepts seem to be paramount in the corporate guidance of Nathanael Davis—youth and flexibility. Many of the company executives are in their thirties. And there are no organization charts at Aluminium Ltd.

Important in Mr. Davis' private life are his wife Lois and their two children, their home in Chestnut Hill, Mass., sailing and civic affairs.

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wide selection,
dependable delivery of

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For a *full* selection of cold rolled specialty steels — call Crucible. Deliveries are on-schedule — in the size, grade, finish or length you need.

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Whether you use carbon spring steel, alloy strip steel, or many other ferrous analyses that can be cold rolled, you can't beat Crucible. More information is contained in the 32-page booklet, "Cold Rolled Specialty Steels". Write for your free copy now. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

The Iron Age INTRODUCES

J. O. Phillips, named assistant to president, sales, **Heppenstall Co.,** Pittsburgh; **Dr. Robert B. Corbett,** named assistant to president, technical, and will continue as head of research dept.

T. B. Daniels, named assistant to division vice president, Warehouse Div., **Jones & Laughlin Steel Corp.,** Indianapolis.

Edmund West, named vice president, manufacturing, **Pressed Metals of America, Inc.,** Port Huron, Mich.; **Donald J. Clark,** named sales manager; **Louis J. Aure,** appointed chief engineer, new products and design.

W. A. Richards, Jr., elected vice president, **Micro Products Co.,** Chicago; **G. L. May,** elected vice president and general manager.

Charles F. Trapp, Jr., elected vice president, sales, **Formsprag Co.,** Van Dyke, Mich.; **L. T. Szady, P. E.,** elected vice president, engineering.

Joseph R. Hager, Jr., named director, manufacturing, **Gar Wood Industries, Inc.,** Wayne, Mich.

John B. Bowman, elected vice president, sales, **Ekco-Alcoa Containers Inc.,** Wheeling, Ill.; **Louis W. Schumm,** elected vice president, manufacturing.

John E. Miller, elected vice president, **Miller and Co.,** Chicago; **J. D. Kettering,** named assistant treasurer and comptroller.

Bruno Leonelli, elected vice president, **Wagner Brothers, Inc.,** Detroit.

Harry N. Eidswick, elected assistant treasurer, **National Can Corp.,** Chicago; and will continue as controller, Pacific Div., San Francisco office.

Raymond J. Russette, named superintendent, planning, **Dodge Div.,** Chrysler Motors Corp., Detroit.

Joseph A. Whittaker, appointed manager, product service, Medium Steam Turbine, Generator and Gear Dept., **General Electric Co.,** Lynn, Mass.

Allan Adams, named manager, quality control, Special Products Div., **Ford Motor Co.,** Dearborn, Mich.

Edward L. McCall, appointed general manager, manufacturing plant, **IBM Corp.,** Greencastle, Ind.

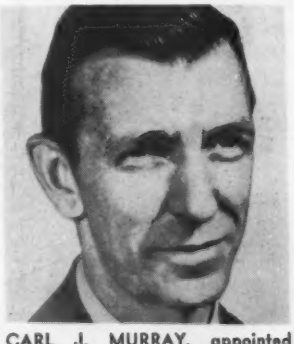
J. T. Barclay, named fabricating works manager, Vancouver operations, **Aluminum Co. of America,** Vancouver, Wash.; **E. D. Mairs,** named manager, Alcoa's Lafayette, Ind. Works.

Following appointments are within the Industrial Sales Div. of the **National Supply Co.,** Toledo: **Carl W. Palmer,** named sales supervisor; **James L. Glidden,** named sales engineer; **Robert R. Sloan, Jr.,** named sales representative.

EDWIN R. FELLOWS II, elected vice president and general manager, The Fellows Gear Shaper Co., Springfield, Vt.

VINCENT L. BRADFORD, elected executive vice president, Milford Rivet & Machine Co., Milford, Conn.

E. A. CHANNER, elected vice president, The H. M. Harper Co., Morton Grove, Ill.



CARL J. MURRAY, appointed works manager, Buffalo, N. Y. plant, Wickwire Spencer Steel Div., The Colorado Fuel and Iron Corp., New York.

"I recommend the Airco 387 Electrode for welding mild steel"

It's the most versatile of all 6012 electrodes. Good wetting action of the Airco 387 electrode permits the use of high current and travel speed on both thick and thin sections. The fluxing action of the slag results in smooth, uniform deposits of superior appearance with minimum spatter. Especially recommended for single pass horizontal fillet welds because of ease of handling, good weld profile and ability to withstand high welding current.

This is but one of many electrodes in Airco's complete line that also includes stainless steel, hard-facing, cast iron, general and special purpose electrodes. Send for free Airco Electrode Guide which will help you select the right electrode for your specific job. Request catalog 1318-IA.

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In Cuba—
Cuban Air Products Corporation
In Canada—
Air Reduction Canada Limited

Dr. John G. Thompson, retired as chief metallurgist, **National Bureau of Standards.**

William B. Knoderer, named sales manager, Industrial Div., **Gardner-Denver Co.,** Quincy, Ill.; **N. M. Fishback,** named sales manager, Mining and Contracting Div.

Charles E. Boak, appointed manager, Fabricating Div., **Plume & Atwood Manufacturing Co.,** Thomaston, Conn.; **John Boak,** named manager, Mill Div.

H. B. Caldwell, appointed manager, New York district office, **Whiting Corp.,** Harvey, Ill.

Samuel C. Harris, named general assistant to the management, du Pont Electrochemicals Dept., **E. I. du Pont de Nemours and Co., Inc.,** Wilmington; **Richard B. K'Burg,** named director, sales, **Arthur I. Mendolia,** named assistant director, sales; **Dr. H. K. Livingston,** named assistant director, research.

S. E. Flenner, named product manager, Washing Machine Parts, Ingersoll Products Div., **Borg-Warner Corp.,** Chicago.

Joseph Montgomery, appointed general sales manager, Sales Div., **Elox Corp.** of Michigan.

Raymond M. Maloney, named assistant to sales manager, **Continental Screw Co.,** New Bedford, Mass.

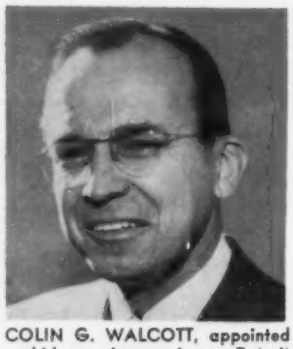
Glenn C. Merkley, named plant manager, **The National Supply Co.,** Torrance, Calif.

H. R. Bryant, named sales manager, refrigeration specialties, **Westinghouse,** Springfield, Mass.; **C. W. Paulson,** named manager, Room Air Conditioner Dept.

Norman F. Burdette, named manager, **Baker-Raulang, Co.,** Dallas, Tex.

Henry L. Kaminski, named manager, Methods Development Dept., **Gemmer Mfg. Co.,** Detroit.

HAROLD F. MILLER, appointed assistant general manager, Bethlehem plant, Bethlehem Steel Co., Bethlehem, Pa.



COLIN G. WALCOTT, appointed carbide service engineer, Detroit district, Firth Sterling, Inc., Pittsburgh.

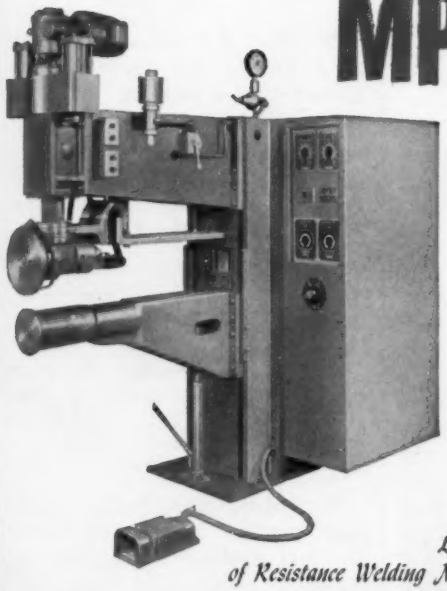
HUGH V. McGUIRE, appointed manager, equipment installation sales, Hanson-Van Winkle-Munning Co., Matawan, N. J.

ALFRED H. STULLICK, appointed foundry superintendent, Superior Brass Works, Inc., Detroit.

FOR THE FIRST TIME A COMPLETELY NEW DESIGN OF SMALL, LOW PRICE SCIAKY SEAM WELDERS

Featuring all the Ruggedness, Dependability and Consistency of Operation Common to Sciaky Basic Thinking—Welders Designed to Do More Useful Work at Lower Operating Cost with Maximum Reliability!

MP-2 AIR OPERATED, PRESS TYPE, LOW IMPEDANCE, SINGLE PHASE SEAM WELDER



Through advanced design, volume production tooling and complete use of integrated parts, Sciaky has been able to add a seam welder to its line of competitively priced, small, standard welders. Check these important design features...

Pneumatic Double-Acting Cylinder Head
Low Inertia, Anti-Friction Bearing Guided Ram
Side Mounted Sciaky Integral Control
Low Impedance Secondary Circuit
Sciaky High Efficiency Welding Transformer
Copper Alloy, Fully Adjustable Lower Arm
Silver Plated, Laminated Flexible Shunt Conductor
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For complete details and specifications on the MP-1 seam welder write for Bulletin 321-7.

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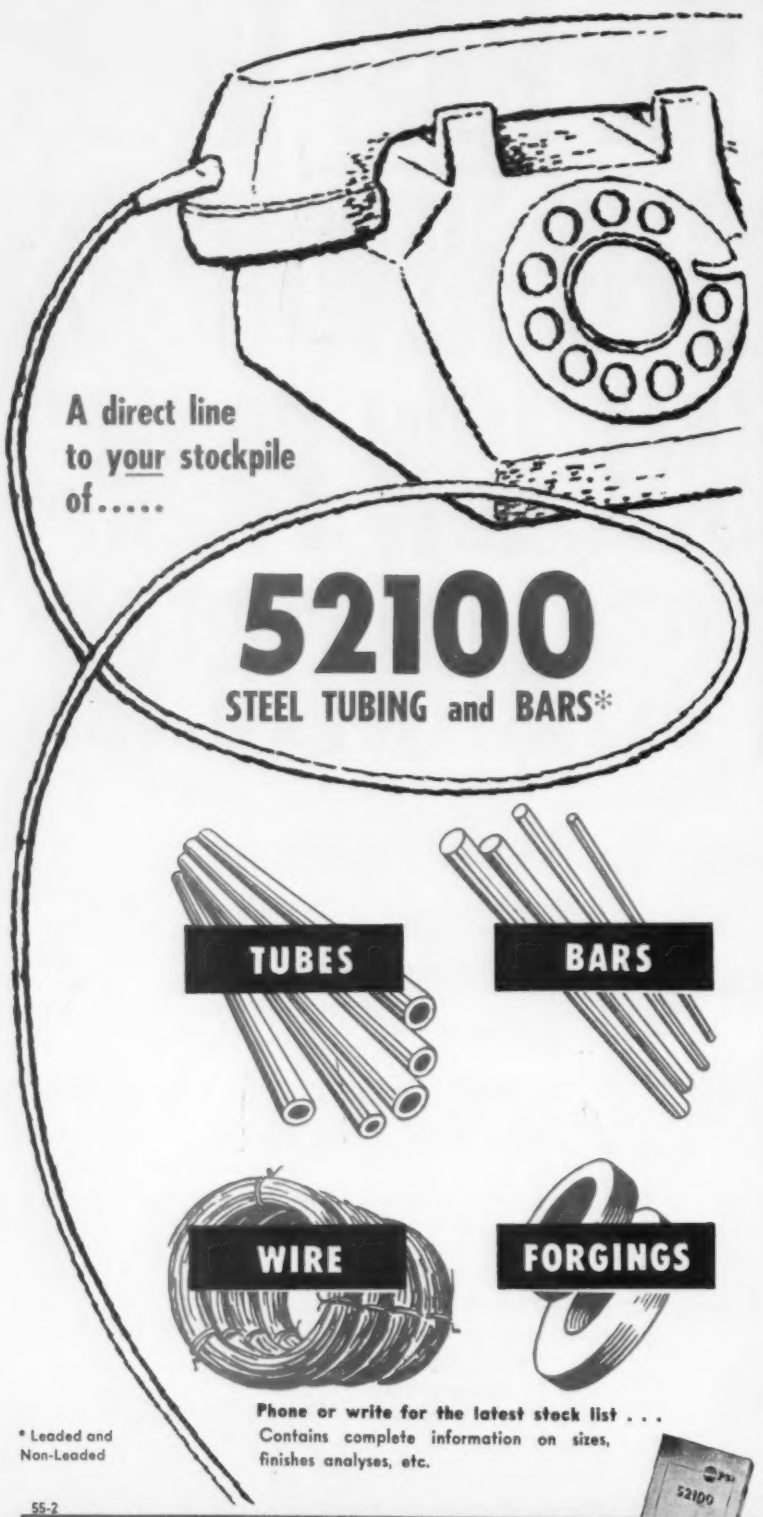


Charles A. Biller, named manager, Foreign Sales Dept., **E. F. Houghton & Co.,** Philadelphia; **Armand J. Andre,** named assistant sales manager, Southern Div., Charlotte, N. C.; **William Eismann,** appointed acting research manager.

William F. Moran, Jr., named sales engineer, **Teck, Inc.,** Dumont, N. J.

Donald J. Sauser, appointed service engineer, Cherry Rivet Div., **Townsend Co.,** Santa Ana, Calif.

Herbert D. Roy, named plant engineer, Engineering Dept. **Granite City Steel Co.,** Granite City, Ill.; **Eugene Whitaker,** named chief mechanical engineer; **Raymond Barr,** named assistant to chief engineer.

Robert S. Holdsworth, named to staff, Research Div., **National Research Corp.,** Cambridge, Mass.

Emil J. Unger, named to inside sales force, Michigan and Chicago area, **The Cleveland Cap Screw Co.,** Cleveland.

Arthur W. Sommerville, named sales representative, St. Louis, **Hanson-Van Winkle-Munning Co.,** Matawan, N. J.

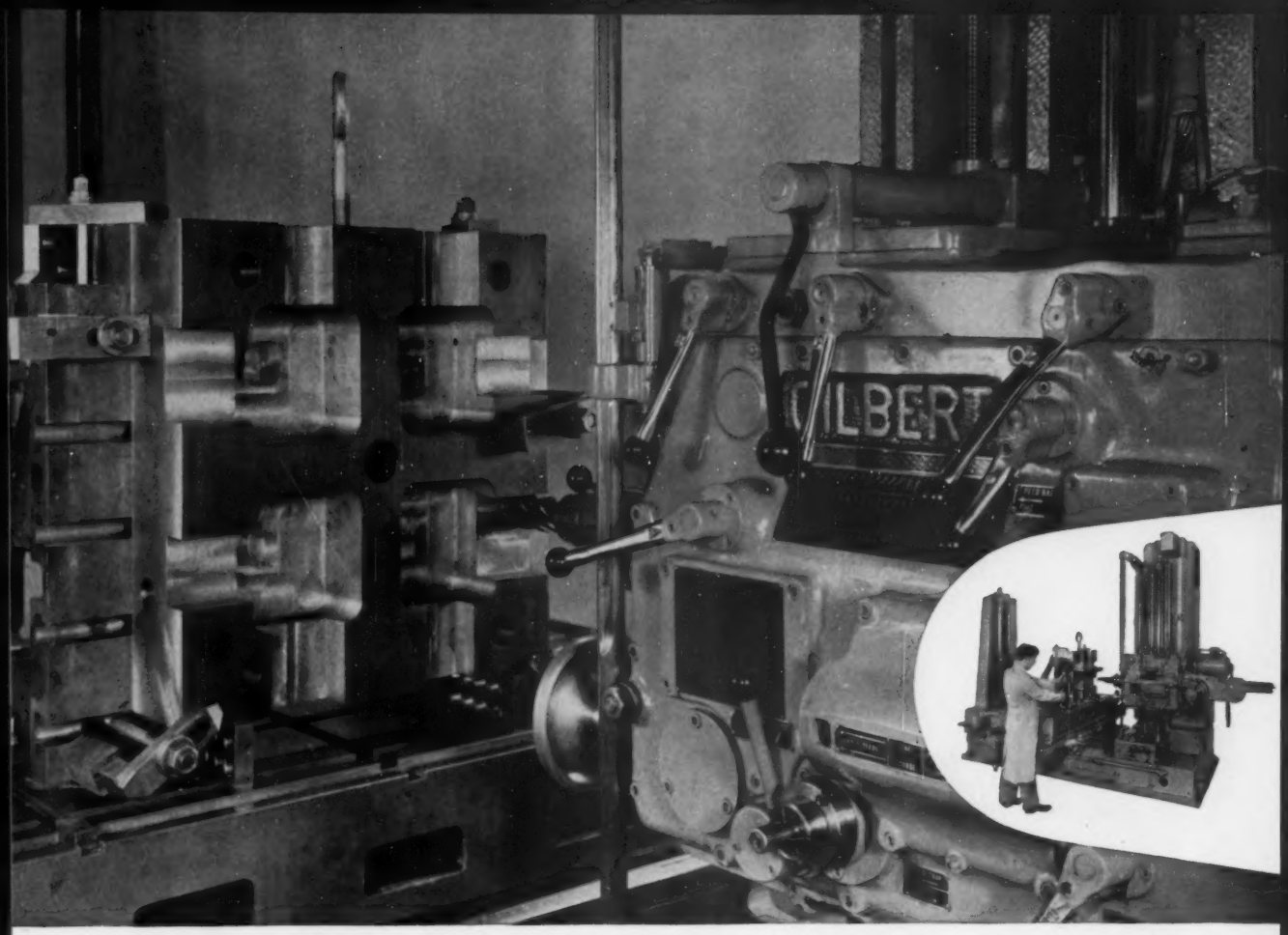
Benjamin E. Ellis, named senior engineer, Electronics Dept., **United States Testing Co.,** Hoboken, N. J.

Walter L. Threadgill, named methods engineer, Engineering Works Div., **Dravo Corp.,** Pittsburgh.

OBITUARIES

Melvin E. Murphy, 59, vice president, Eastern operations, **National-Standard Co.,** Worcester Mass.

Everett H. Clark, 55, vice president, product engineering, **International Packings Corp.,** Bristol, N. H.



courtesy Mohawk Tool & Die Corporation and Macauley Machinery Co.

30 percent savings and ±.001"

...match it with a Gilbert

How's this for a perfect lineup: 30% savings in floor-to-floor time over previous machines, and ±.001" for mating the two chases of a four-cavity carburetor bowl mold.

Mohawk Tool & Die Corp., Rochester, N.Y., gets these savings and accuracy by handling the job on a Cincinnati Gilbert horizontal boring mill.

Here the lower chase (of hot work die steel) is being rough machined. Then it's hardened to a Rockwell of 48-50C scale. Finally, the chase is finish machined with carbide to an accuracy of ±.001" for guide pin and bushing holes, four cavity pockets, and eight slide ways.

Says Mr. George Neward, Mohawk's Secretary-Treasurer: "This job illustrates the flexibility of this type of machine. The ruggedness and stability of the Cincinnati Gilbert has been proven to us without doubt."

The comparatively low cost of adding these advantages to your operations will surprise you. Write for new literature, or—better yet—get a proposal from Gilbert now.

The Cincinnati Gilbert Machine Tool Co.,
3366 Beekman Street, Cincinnati 23, Ohio

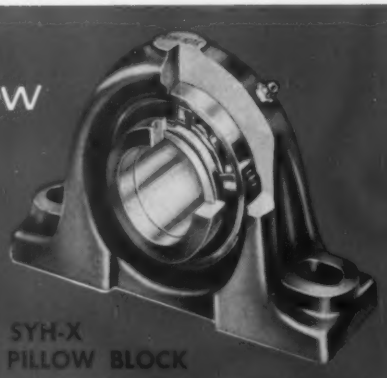
You can buy a new compound table type Gilbert horizontal boring mill on a 5-year payment plan for as little as $5580 down and $428.36 a month. This is $1.28 an hour on a two 8-hour-shift operation. Includes low 6% simple interest (3% add on).

those who buy Gilbert buy **GILBERT** *again*

Most Positive Bearing For Dirt Exclusion and

now - a complete line of unit pillow blocks

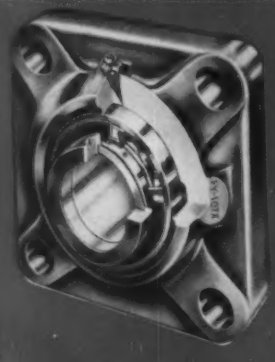
New



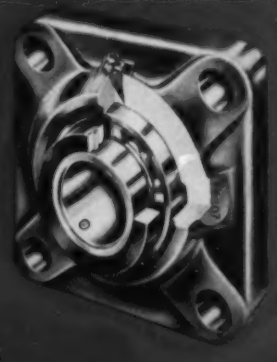
TYPE SYH-X
UNIT PILLOW BLOCK
For eccentric-lock shaft mounting — interchangeable with pillow blocks having reduced center heights.

TYPE SY
UNIT PILLOW BLOCK
For set screw shaft mounting.

New



TYPE FY-X
UNIT FLANGED MOUNTING
For eccentric lock shaft mounting.



TYPE FY
UNIT FLANGED MOUNTING
For set screw shaft mounting.

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...fully interchangeable with other makes

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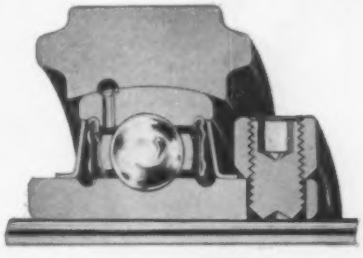
Shown on the right is SKF's Bearing Seal Design which is the most effective ever developed. The seal itself, made of a specially designed metal backing plate and a Du Pont Fairprene washer, is staked into the bearing outer ring and makes *light* but *positive* contact with a groove in the bearing inner ring—a contact seal that acts as a relief valve and *can't pop out* when lubricant is added. This Red Seal is augmented by a rotating flinger—together they provide positive dirt exclusion and lubricant retention.

2751

SKF RED SEAL



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FEATURE ARTICLES

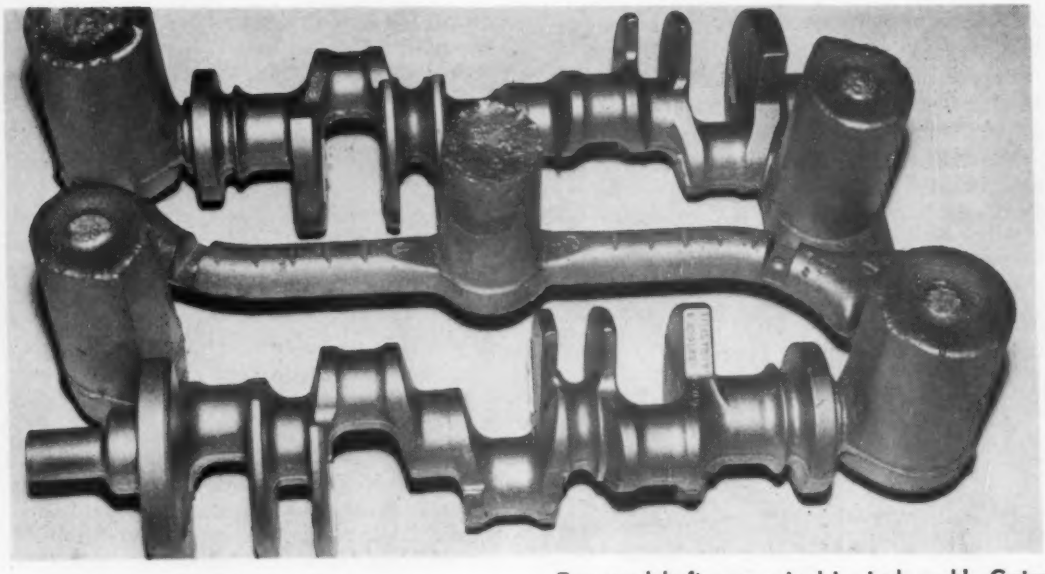
◆ Shell molding a brand new steel provides an improved product at lower costs . . . In addition to design advantages, machining time is profitably cropped . . . Tool life is increased.

◆ Viewed from the shop standpoint, the meteoric growth of shell molding isn't accidental . . . This particular crankshaft application spells out some of the more important reasons behind a growing trend.

Casting gains another round—

Speedy Shell Molding Saves Machining Time

By W. G. PATTON, Engineering Editor



Two crankshafts are paired in single mold. Gates and risers are parted from castings mechanically.

◆ SHELL MOLDING has grown by leaps and bounds. But when you combine the latest techniques with a new composition of steel, all sorts of possibilities are opened for casting products which previously were difficult and costly to forge and machine.

Central Foundry Div. of General Motors proves the point. In casting crankshafts for the Pontiac Motor Div., it turns out a better product at lower cost. Big savings in machining time and material are thrown in as a bonus.

Two "firsts" stem from this development. It's the first use of ArmaSteel (containing microscopic additions of bismuth and boron) for a precision cast crankshaft. It's also the first use of a cast crankshaft in a GM car.

Now that the desirable properties of ArmaSteel have been determined, and the casting method and cost figures worked out, it's likely that new uses for shell molding will be sought.

Competitive with forging

No cost figures were revealed at Danville, Ill. recently where the process was shown publicly for the first time. However, there was no doubt that ArmaSteel cast crankshafts are strongly competitive with forged crankshafts, and that the process offers advantages in design, amount and ease of machining, and tool life.

Reports by the foundry industry insist that savings in production costs may equal 10 to 15 pct of the previous cost of the finished part.

Substantial weight is saved by going to the cast crankshaft. Gross weight of a forged Pontiac V-8 crankshaft for the present engine is 76 lb. Machining removes 18 lb of steel, bringing the finished weight to 58 lb.

Using ArmaSteel, as-cast weight is only 64 lb. Only 10 lb of metal is removed during machining, bringing the finished weight to 54 lb. Thus, less metal is removed during machining, machinability of the part is improved and weight of the part is reduced 4 lb. Moreover, Pontiac engineers claim that the cast crankshaft is superior in many respects to its forged counterpart.

The research story behind ArmaSteel is extensive as well as impressive. Early in the 1920's, A. L. Boegehold, Assistant to the Director, GM Research, started work on the problem of shortening the annealing cycle for malleable iron. At the time work was started, the annealing cycle required more than 100 hours.

Almost 300 lb of steel are poured into each mold. Bismuth is added just before pouring.

The remarkable growth of shell molded products produced by the Central Foundry Div. is reflected in the following figures:

	Shell Molded Products (Tons)
1951	3
1952	650
1953	3,700
1954	6,500
1955	20,500
1956	Over 100,000

Changes in chemistry, plus the development of better furnace equipment with atmosphere control, reduced the cycle to 32 hours. Later, this was further reduced.

Boegehold holds several patents on short cycle malleable iron, including a patent covering bismuth additions granted in 1942. Both the Crane Co. and General Motors hold patents on the use of bismuth and boron in malleable iron.

Many points in its favor

Bismuth content of ArmaSteel used in crankshafts is 0.02 pct. Boron content is 0.003 pct. The bismuth and boron additions are necessary in a large section like a crankshaft to produce the desired distribution of pearlite in annealed ArmaSteel.

Advantages of the new, precision cast ArmaSteel crankshafts may be summarized as follows:

1. Unlimited supply of non-critical material.
2. Less stock removed by machining.
3. Several machining operations, including cheeking, are eliminated.
4. Wider latitude for crankshaft design.
5. Good dimensional control.
6. Improved machinability and better tool life.
7. Lower overall cost.

Actually lower overall costs may be due as much to gains in manufacturing efficiency as to improvement in processing.

Many competent observers believe the Danville foundry operation is probably among the most efficient, high production shell molding operation in the country today.

Shell molding of crankshafts by the Central Foundry Div. is distinctive in several ways:

Shell making machines are cycled automatically. One makes cope, while the other makes drag.

After final tempering operation, crankshafts are automatically fed to a straightening press.

1. This is the only automotive crankshaft being produced of ArmaSteel; other producers of cast crankshafts use nodular iron.

2. GM has eliminated the use of shot for backing the molds. The molds used are approximately twice as thick (⅝ in.) as conventional shell molds for this application. Efforts being made to reduce this are promising. In addition loose, unbonded sand is added underneath and on top of the molds.

3. Sutter molding machines with built-in electric heating units are used. Pattern life has been excellent.

4. A wax-type parting solution is employed.

5. Two castings are poured in a horizontal position. (Firms using shot backup generally pour crankshafts vertically.)

6. The two molds are joined by gluing.

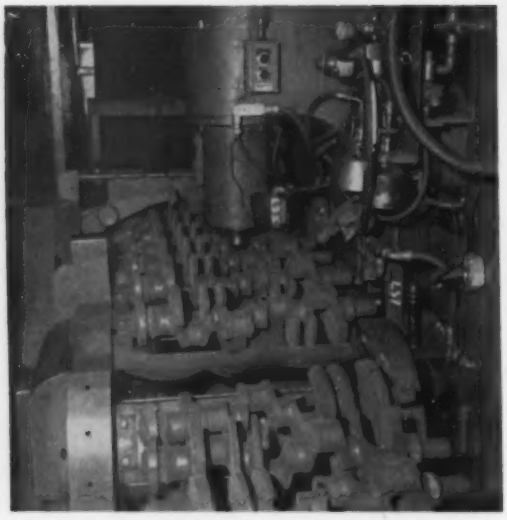
In addition, there are other features of the Danville operation that are either unique or are not widely used in U. S. foundries today.

Shakeout is 100 pct mechanized. An operator, seated at a console, controls all shakeout operations.

Gates and risers are removed by swinging a heavy pendulum.

Castings are Brinelled 100 pct without manual handling. Equipment is fully automatic.

There is also 100 pct Magnaglow and 100 pct resonance inspection.



An automatic Brinell hardness tester handles loading, spot grinding, testing, and unloading.

Probably the outstanding contribution to the efficiency of the entire operation is the substitution of mechanical equipment for practically every manually handled job in the entire foundry. The cleanliness and housekeeping of the Danville foundry is outstanding.

The first sample ArmaSteel crankshaft was put on test in February 1953. A total of 24 crankshafts was furnished to Pontiac Motor Div. in November 1954. By August 1955 Pontiac was using 25 pct cast crankshafts. Early in November this was increased to 75 pct. Pontiac is now using 100 pct ArmaSteel shell cast crankshafts.

Machinability of the ArmaSteel crankshafts is rated 33 pct better than SAE 1045. Tensile strength is in the range of steel: 100,000 psi. Elongation at 100,000 psi tensile is approximately 2 pct.

According to Pontiac, rack-to-rack lathe cycle time on in-line diameters has been cut in half. For some machining operations, the life of high speed tools has been quadrupled. Life of some carbide tools has been extended ten times.

Use double-thick shells

Mixed shell material is transferred in a closed conveyor to the shell making machines. The Sutter machines cycle automatically. Electric heat is used for the patterns.

After dumping the sand-resin mix over the heated patterns, the shell is cured with gas heat. The completed half shell is then stripped from the pattern.

Cope and drag shell molds are produced side by side, then transferred for assembly. Thickness of the shell is $\frac{5}{8}$ in., about double the thickness of other shell molds for crankshafts. A wax parting solution is applied automatically between operations.

Resin glue is vibrated onto the outer margin of the cope shell in a series of spots. The cope is then placed on the drag and squeezed. The heat in the shell helps to produce a very strong bond. Clamps are not required.

Shells are then transferred to a conveyor that is synchronized with the molding conveyor. Each shell is bedded in loose sand. It is then covered with additional sand. The sand additions provide backing in much the same way as shot is used in other shell molding operations, except that handling of sand is easier.

Boron is added with the charge as a 5 pct boron, ferro-silicon alloy. Bismuth is added to the ladle just before pouring the castings.

The shakeout operation is performed mechanically on equipment developed by the Danville plant. The operation is completely automatic. After 30 min, the castings are debobbed mechanically. They are then transferred to the Annealing Dept. for initial cleaning and inspection.

To minimize warpage during the 21 hr annealing cycle at 1750°F, castings are placed in individual alloy cradles. The packed cradles are placed on a 3-tray carrier for transfer to the kilns. The carrier moves automatically to a predetermined station. Castings are air quenched from 1650°F, then reheated to 1200°F and tempered to Bhn 217-269.

Test shafts sonically

Next operation is hot straightening in a press which rolls the crankshaft 90° in the fixture, presses the shaft again and then ejects it.

Crankshafts are then taken outside by conveyor for cooling. The conveyor has automatic pickup hooks.

The cooling conveyor unloads automatically at the Brinell fixture. The fixtures indexes, positioning the crankshaft under the automatic grinder. After grinding, the machine indexes to the Brinnel machine. If the proper hardness range is maintained, the crankshaft is sprinkled with a dye. If the hardness is out of range, the dye is not applied. Unloading from the machine is fully automatic.

Following end milling and centerdrilling operations, crankshafts undergo 100 pct Magnaglo inspection.

The crankshaft is then lowered into a sonic test chamber. A hammer trips at the base, ringing the crankshaft. The tone is measured electronically. If the tone is within the specified range, a dye is sprayed on the crankshaft. Periodic soundness tests of crankshafts are also made, using Cobalt 60.

An advantage of shell molded crankshafts that is hard to evaluate is ability to produce crankshafts that could not be readily forged.

Cuts aluminum fast—

◆ Arc cutting of aluminum is new . . . As such, there have been no figures on actual savings in time, space, labor and overall production costs . . . Some of the answers are now given from one of the first production setups.

◆ In making aluminum tanks, cutting costs are down more than 95 pct . . . One operation which previously took 5 hours now takes only 5 minutes . . . Welders pick up the new technique in an hour or less.

Arc Cutting Makes Debut In Tank Fabrication

◆ ARC CUTTING of aluminum, only out of the development stage six months, is rapidly catching on as a major metalworking advance. Early claims for the process sounded almost fantastic, but these claims are now confirmed by one of the first production applications of this high-speed technique.

Production experience at the Edge Moor, Del., plant of Graver Tank & Mfg. Co. is impressive. Speeds on manual and mechanized arc cutting range from 37 to 62 ipm through 5/8-in. aluminum plate.

Beveling, grooving, shaping and cutting operations are carried out as standard procedures on a regular shift basis. The arc cutting technique plays an important role in weld fabrication of 10,000 gal, low pressure aluminum vessels. Tanks are 30 ft long by 7 ft diam., and are constructed of 52S aluminum plate 5/8 in. thick.

Dome holes atop the tanks are manually cut in 4½ minutes. Holes are 54-in. diam, involving a running cut of 170 in. Average cutting speed is 37 ipm.

Dome holes were previously chipped by power tools. At least five hours per hole were required. Production time of the operation now amounts to less than 5 pct of the former figure. Costs are down a similar percentage, since time is a controlling factor in their calculation.

In addition to clearly defined savings in production time, worker fatigue is less by some indeterminate amount. Earlier chipping operations had a noise level in excess of 100 db, too high for continuous work without aural fatigue. Arc cutting noise is slight.

Smaller assembly area

Work space is one third that required previously. Formerly, three tanks were chip-cut at once to maintain a smooth and continuous production flow. More than 1000 sq ft were needed. Now the entire production line is supplied by a part-time operator and his helper, arc cutting one tank at a time in a station occupying about 350 sq ft.

Similar results on more than a dozen other aluminum cutting operations have impressed Graver engineers. All aluminum cutting now is accomplished by the Heliarc process, developed by Linde Air Products Co. Div. of Union Carbide & Carbon Corp., New York.

PANTOGRAPH arm holds mechanized arc cutting torch, which cuts 5/8-in. plate at 58 ipm.

Within weeks, production will begin on pressure vessels of 15/16 in. thick aluminum plate. This too is scheduled for Heliarc cutting.

Major problem in flame or arc cutting such nonferrous alloys as aluminum has been thermal conductivity. In aluminum this ranges from 0.26 to 0.54 CSG units, compared with 0.11 at room temperature for a typical carbon steel. Heat is rapidly dissipated by aluminum, unduly lengthening time required to reach the melting temperature. Answer lies in rapid heating of the aluminum, so rapidly that even heat treatable alloys are affected only locally.

Technology behind Heliarc cutting is simple, considering the somewhat spectacular results. Basically the process is akin to inert gas, non-consumable electrode arc welding. In both cases, a similar electrical circuit is employed with tungsten electrodes and a shielding gas.

From that point on, things differ. Arc cutting deliberately employs a harsh arc. The arc is restricted by a small diameter orifice in the cutting nozzle. Hand selected and carefully pointed electrodes are used. Proper centering and location of the electrode is most important to obtain high quality cuts.

Cutting temperature is so high that the nozzle head must be continuously cooled with water flowing at 2 qt per minute.

Since this arc is highly constricted, operating voltage of the arc is abnormally high (55 to 75 v). A power supply is required which gives high amperage at that operating voltage. The only power supplies commercially available to give these power requirements are motor generators or two rectifiers connected in series.

Result is a concentrated arc stream 5/32 in. or less in diameter. This stream melts an extremely localized area almost instantaneously. In aluminum plate up to 1-in. thick, the arc plunges through the metal and flings molten aluminum away from the kerf. The finely divided aluminum particles rapidly solidify and settle as dross.

Despite the high speed, the resulting cut is clean and smooth. It closely resembles the better cuts produced in steel by an experienced operator with an oxyacetylene torch.

Skill requirements are nominal. Certified welders can do an excellent cutting job after less than one hour of instruction. A good cutting operator can reach the same level of proficiency in the same time. Satisfactory work on a manual machine is being turned out by a Graver operator, who only six weeks before was a helper on the production floor.

TABLE I

Some Typical Arc Cutting Operations

Operation	Length, in.	Saw or Chip Time, min.	Arc Cut Time, min.	Rate, ipm
Cutting—				
54 in. diam.	170	300	4.54	37
18 in. diam.	56.5		1.0	56
11 in. diam.	35		0.75	47
7⅞ in. diam.	25		0.60	42
Shaping—				
stiffeners	137	27	2.35	58
Beveling—				
stiffener ends (both)	26		0.45	58
inner arc	54		0.81	62

TABLE II

For Manual Arc Cutting Use—

Thickness in.*	Speed, ipm	Flow, cfh**	Orifice diam., in.	Amp, dcsp	Volts
0.25	60	50	1/8	200	50
0.50	40	60	1/8	240	60
0.75	25	70	5/32	300	65
1.0	20	70	5/32	340	68

(* All cuts square) ** 80 pct A- 20 pct H_2

Production costs primarily involve labor, gas, electricity, equipment depreciation, licensing and minor maintenance. Gas cost in the dome hole cutting operation previously mentioned runs less than 40¢. Electricity and depreciation cost for the same are negligible.

Maintenance cost in normal operation is similar to that of the average welding machine.

IN 36 seconds, this 7 7/8-in. diam hole is arc cut in aluminum tank dome. Manual speed is 42 ipm.

Double-tipped tungsten electrodes are carefully pointed to avoid eccentricity. Each lasts 6 to 12 months, then is replaced at a cost of about $4. Gaskets and torch orifice insert are considered expendable.

Initially, orifice inserts may be a major maintenance item, due to operator inexperience. The insert burns and scores if the torch is grounded against the aluminum plate. Rough cutting results, due to the off-center arc. Orifice replacement cost is less than $2.

Total equipment cost is in the $2500 range, including a manual or automatic torch with a matching power source. Minus the power source, the price is less than $1500.

Cutting speed depends on several factors, including plate thickness, amperage and gas flow. Current must equal or slightly exceed the values shown in tables II and III.

In practice at Graver, current is often standardized and cutting speed, variations are largely achieved by increasing or decreasing gas flow. Once a speed is selected, and amperage and gas flow adjusted to correspond, the operator must move the torch across the workpiece at that rate. With speeds slower than those matching the gas flow, the cutting arc may be lost or broken due to metal removal.

Less rapid cutting rates for inexperienced operators are easily achieved by adjusting gas flow. In addition, the operator may stop cutting at any time without mutilating the kerf simply by pulling the torch more than ½ in. away from the workpiece.

Inert gas mixture also has some effect on cutting speed. Automatic equipment cutting at speeds up to 300 ipm on ¼-in. plate uses 65 pct welding grade argon and 35 pct hydrogen. Arc length of ¼ to 5/32 in. is critical with gas in these proportions. Manual adjustment is helpful on mechanized equipment to compensate for plate irregularities.

Arc length on the manual torch is less sensitive. Any length between ⅛ and ¼ in. is satisfactory. This greater tolerance is made possible by increasing argon to 80 pct, and reducing hydrogen to 20 pct. Boosted argon content is reflected in slower cutting speeds: on the order of 60 ipm in ¼-in. plate. Even that velocity is as high as normally necessary.

In another cutting operation, Graver operators use an automatic machine to shape aluminum plate into segmented stiffeners in less than 2½ minutes.

TABLE III

For Mechanized Arc Cutting Use—

Thickness, in.	Cut	Speed, ipm	Flow*, cfh	Orifice diam., in.	Amp, dcsp	Volts
0.25	Square	50	50	1/8	180	62
	Square	300	60	5/32	380	70
0.50	Square	35	50	1/8	200	60
	Square	150	60	5/32	400	65
	45°	70	60	5/32	300	65
	30°	80	60	5/32	360	66
0.75	Square	15	60	1/8	180	70
	Square	75	60	5/32	350	70
	30°	35	60	5/32	350	70
1.0	Square	50	70	5/32	400	72

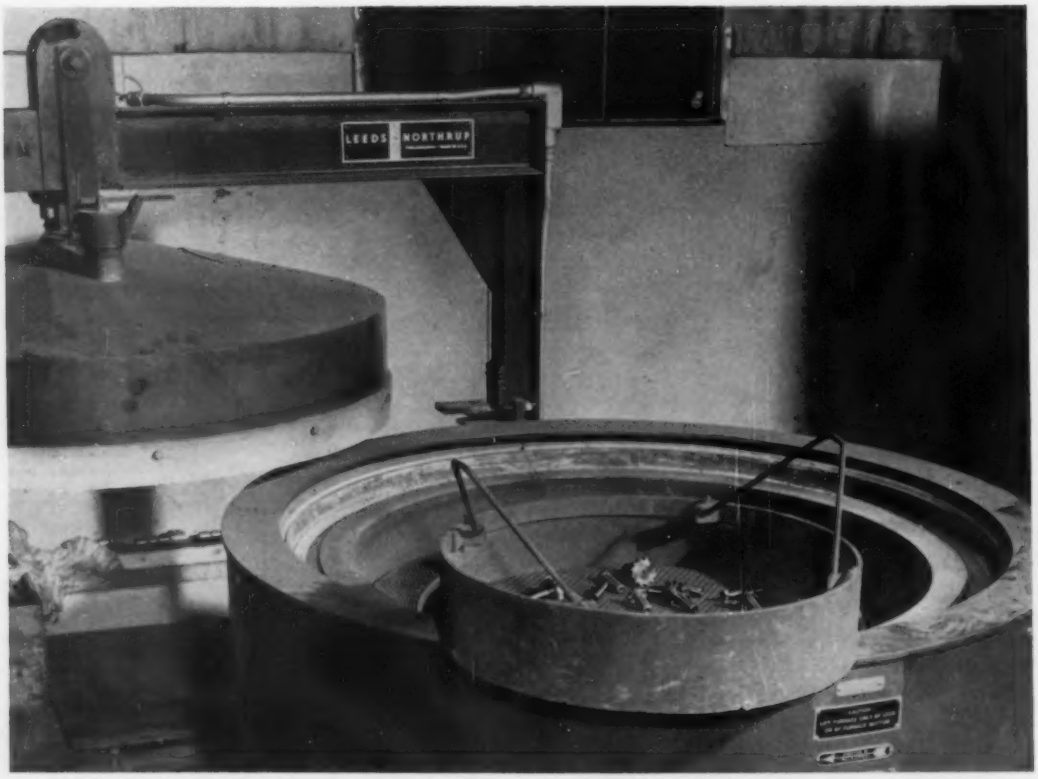
* 65 pct A, 35 pct H_2

Tool life goes up—

Steam Treatment Solves Tough Tooling Problem

◆ Despite modern tooling, many machining problems are just plain rough . . . For example, when the job calls for milling a 0.250-in. keyway slot into 4140 cold-rolled steel barstock, heat-treated to Rc 34 to 38 range.

◆ This was A. B. Farquhar Div.'s problem . . . Due to a vibration problem, high-speed steel milling cutters were lasting for four pieces only . . . Hard-chroming, carbide substitutes helped but little . . . Steam-treating jumped cutter life 1000 pct.



STEAM-TREATMENT calls for soaking cutters for one-half hour at 1025°F in steam atmosphere, air-cooling without forced cooling. Tools then are dipped in oil and are ready for use.

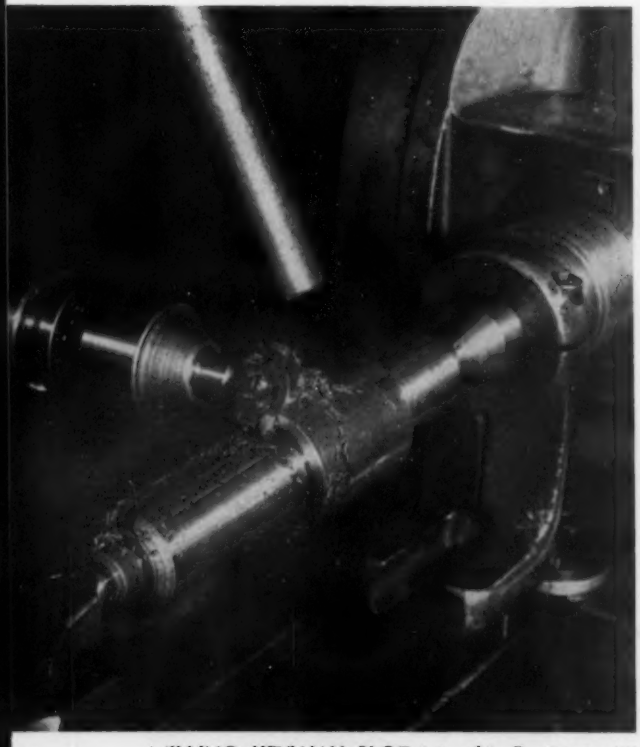
◆ IMPROVED tool life is being obtained on a tough milling cutter application by furnace-treating high-speed steel cutters in a steam-oxidizing atmosphere prior to use. Average cutter life is up more than 1000 pct—and results are reported consistently good.

In fact, on the particular application, and with the particular machines available for the operation, the steam-treated high-speed steel cutters are outlasting carbide cutters by better than 8:1.

The knotty machining problem came up about a year-and-a-half ago. A. B. Farquhar, a division of the Oliver Corp., and located at York, Pa., took on a contract calling, in part, for the milling of a 0.250-in. wide keyway slot into a piece cut from 4140 cold-rolled steel barstock. Specifications required that this be heat-treated, prior to the milling operation, to a hardness of Rc 34 to 38.

On top of this, tolerances were tight—±0.001 in.—and the sides of the slot had to be perfectly square. Milling the 6¾ in. long, 1½-in. diam part proved a problem right from the start.

First cuts were made with a ¼ x 1 Woodruff keyway cutter, on a Milwaukee Model K horizontal milling machine with 18-in. travel.



MILLING KEYWAY SLOT into this Rc 34 to 38 part proved tough on tools. Cutters first produced four parts, couldn't be resharpened. Same cutters, treated, now produce 120 to 125 parts apiece.

A water-soluble coolant was used. Vibration produced in the thin-necked cutter was such that operators were able to get only about four finished parts per tool. This was prohibitive—particularly since the tools couldn't be resharpened because of the tight tolerances required.

The tooling department decided to try hard-chroming the cutters. This was done, and the number of pieces produced per cutter increased to around 11. They then went to carbide tooling instead of the high-speed steel—and began getting from 11 to 14 pieces per cutter.

Next move, at a furnace supplier's suggestion, was to send six of the cutters to the supplier's plant for furnace treating in a steam-oxidizing atmosphere.

Consistently good results

This first experimental batch, when returned, produced about 100 parts per cutter. A second batch was then tried, and turned out 60 to 70 pieces per cutter, on the average. A third lot averaged from 100 to 125 parts per tool.

About this time a standard Homo tempering furnace was ordered from the supplier, the Leeds & Northrup Co., Philadelphia. Farquhar ordered the equipment fitted with the necessary attachments to permit the steam treatment. On delivery, they began steam-treating their cutters as necessary, in between regular drawing operations with the furnace.

With the equipment under their own control, and following the procedure recommended by the manufacturer (see chart below), they began getting from 120 to 125 parts per cutter consistently. They dropped any further experimentation.

Theory on longer cutter life is that the tendency for chips to weld onto cutting edges is minimized. Any buildup increases friction, causing heat which softens the cutting edge.

On completion of the milling operation, the part is drilled with a ¼ x 5/16 in. shaped hole. Parts are then dressed and given a final inspection for dimensions and finish.

Here's The Steam Treat Cycle:

- **Empty furnace is heated to 700°F.**
- **Cutters are loaded at 700°F and furnace is purged of air with steam flow on for ½ hour.**
- **Furnace temperature is brought up to 1025°F and load is held at this temperature for ½ hour.**
- **Cutters are removed from furnace and air-cooled, without forced cooling. Cutters are dipped in oil.**

Simplest is best—

Are Holes In Stampings Giving You Trouble?

◆ Anyone can design a hole, so what's the problem? . . . Simply a matter of doing it right the first time . . . Handling the job in a way calculated to provide long die life, to turn out holes that do their job properly.

◆ Considering costs, it's often not as easy as it sounds . . . These tips on handling hole problems economically will help solve stamped part difficulties in your shop . . . Simplicity is the key, but with a twist.

By FREDERICO STRASSER,
Consultant,
Santiago, Chile

◆ HOLES in stampings are almost inescapable. Perhaps only one stamped part in 20,000 lacks holes. But do holes control your production costs, or do you control them?

In mass production of a new design, changing the location or shape of just one hole can mean $100,000 in new dies. New equipment, new production standards, new time studies, perhaps even new materials may follow.

In today's competitive situation, it sometimes takes only one such change for the top office to begin calling for a new designer or production manager.

So how do you handle holes in metal stampings?

Choice lies between drilling or punching. Die punched holes cost less and lend themselves more easily to high production rates. So drilled holes generally are a second choice, restricted to special situations.

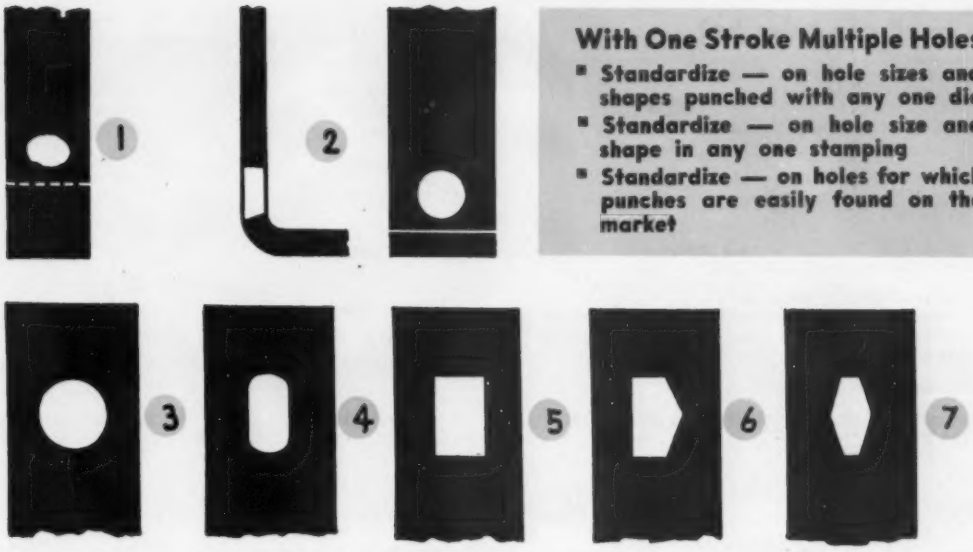
The basics of holes punched in stampings or sheet metal involve: 1) hole shape, 2) minimum dimensions, 3) location and 4) hole walls.

Regarding shape, the practical tips on outer contours of blanks apply. (See the IRON AGE, March 15, 1956, p. 83.) Generally, hole contour is not so critical as blank shape. Preference should be given to the round, as opposed to oval, square or rectangular holes. This is true even if hole diameter should thus become larger than strictly necessary.

Deviations from the round hole almost always are reflected in higher production costs. Such deviations sometimes are essential.

Avoid tolerance troubles with ovals

The hole contour next most acceptable is the ovoid: the oval, or elongated hole. Most often ovals are employed to avoid excessively tight tolerances. This is especially the case with formed or bent parts where variations in size and location of holes can be quite large. Fig. 1 shows an oval hole in a location subsequently formed. On bending, properly located and shaped oval holes will distort neatly into almost round shapes (Fig. 2).



With One Stroke Multiple Holes

- **Standardize — on hole sizes and shapes punched with any one die**
- **Standardize — on hole size and shape in any one stamping**
- **Standardize — on holes for which punches are easily found on the market**

Elongated holes or slots are helpful too in compensating for production inaccuracies, and serve in many cases also as adjustments. Where irregular springback or other unequal metal behavior is encountered in forming, this adjustment feature is important. Correct shapes for such holes are shown in Fig. 3 (preferred) through 7. Avoid punched holes like those in Figs. 8 through 10, since die costs are greater.

Hole size is important only as it affects design location, tolerances and problems in production. With the last, need for small holes is likely to present the greatest difficulty.

Over-all costs are rather high on punching dies for very small holes. Construction and maintenance time, as well as costs, also are excessive. In addition, production troubles with such dies are common, due to marginal punch strength in relation to punch face area.

From such difficulties has come the common adage: "It's not possible to punch a hole in mild steel of smaller diameter than the sheet thickness." That this statement is not true is sometimes most helpful in rescuing one's self from a design corner. Actually, holes smaller than sheet thickness can be and are being punched. Table I and Fig. 11 are derived from practical experience, and illustrate this.

With materials other than mild steel, proportions of the smallest punchable hole to sheet thickness differ. With higher shear strengths, proportions are greater; with lower strengths, they are lower.

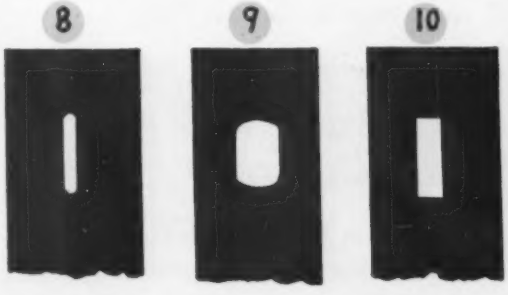
Location of holes is perhaps the most important single factor. In many metal stampings, shape, size and contour of the blank are minor with respect to hole positioning in relation to each other or to design details.

Common sense tells us that the edge of a punched hole must not be unduly close to the blank edge. Otherwise bulging, tearing, deformation, spreading or distortion of the material may result.

Punching holes near edges

Practical experience indicates that smallest distance from the nearest blank edge must be no less than about twice the stock thickness in sheet less than $\frac{1}{8}$ in. thick. In thicker sheet, minimum hole distance from the edge is less critical, and may be as small as the stock thickness itself. In no case should this dimension be less than 0.12 in. with round holes (Fig. 12), nor less than 0.18 in. with straight edge holes (Fig. 13). Further, solid metal at least as wide as the hole radius must remain surrounding the hole (Fig. 14).

The preceding deals with hole design as it affects strength of the material. In addition,



How small can holes be?

Figure minimum hole diam from:

$$d = \frac{4K_1\,tb}{K_2}$$

Where:

d = minimum hole diam (in.)

K_1 = ultimate shear strength of stock (psi) (Mild steel runs about 55,000 psi)

K_2 = actual strength of punch (psi) (Hardened tool steel punches average about 400,000 psi ultimate compressive strength. Maximum actual stress should not exceed ⅔ of this: 270,000 psi.)

t = stock thickness (in.)

b = pct of punch penetration in sheet before pressure snaps out the slug*

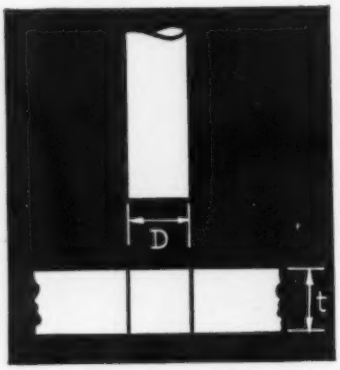
In Mild Steel, for example	
For stock this thick (in.)	Minimum hole diam is (in.)
0.2391	0.097
0.1943	0.089
0.0673	0.041
0.0299	0.0212
0.0120	0.0098

***TABLE I** The following, giving b in mild steel, is derived from practical experience

Stock thickness (in.)	1/32	1/16	3/32	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
pct penetration (b)	87	75	67	62	56	50	47	44	37	34	31	25

the toolmaker's problems must also be considered. For strength alone, a distance between holes of twice the metal thickness is generally sufficient. This dimension, according to the diemaker, is usually sparse or downright insufficient in stamping thin sheet.

A golden rule of the diemaker is that the smallest distance between two near holes in a dieplate should correspond to plate thickness. Dieplate thickness ranges from ½ in. (class C dies) to ⅞ in. (class A dies). According to this dictum, holes may be no closer than ½ in. even with the thinner dies.



11

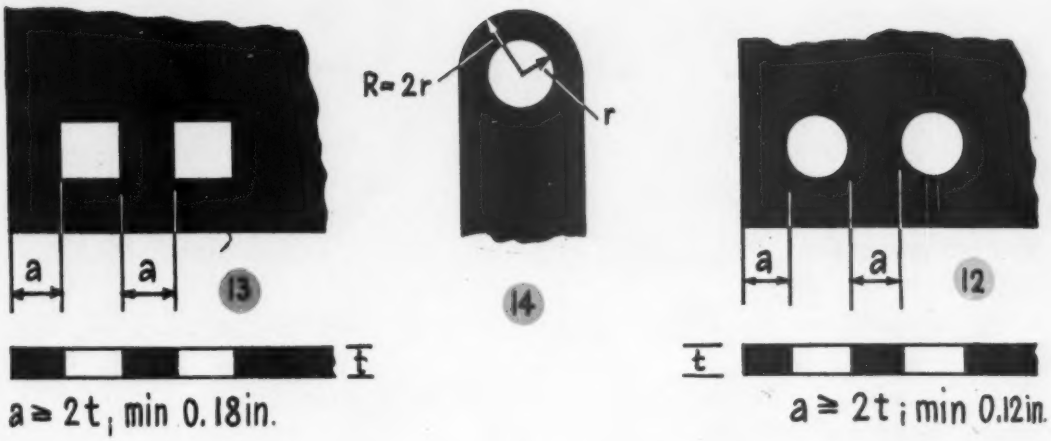
Where inside and outside meet in designing both holes and blanks

1. **Keep it simple**
2. **Avoid anything but flat stock**
3. **Change contours with an obtuse angle**
4. **Use ample radii on contour changes**
5. **Watch punch clearances**
6. **Design both holes and blanks within circular configurations if possible.**

This rule has been ignored in the past, though almost always with disagreeable results. Even if the die survives the heat treatment, its service life is usually low. At this point, progressive stamping operations must be considered—even though costs may go up. Use of multiple punches and an auxiliary die block may also be feasible.

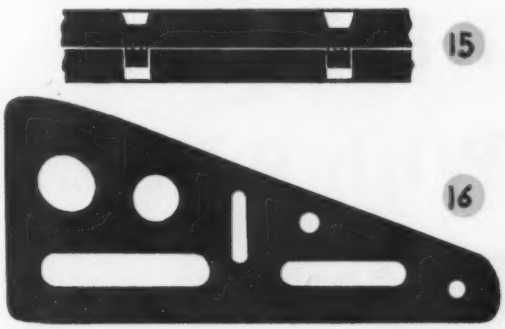
Walls of punched holes are partly irregular: with a bright band (from the die plate) and a rough band (from contact with the punch). Metal adjacent to the hole is somewhat disintegrated because its fibers are bent down in the direction of punch motion. This weakens its structure, sometimes as much as 10 to 30 pct in plates thicker than ¼ in.

This situation may be of minor consequence. If the hole later serves as a bearing, however, a smooth, calibrated cylindrical surface is



What good are holes?

- as bearings for revolving parts
- as guides in alignment
- for clearance of other parts
- for clearance in assembly operations
- when tapped, as nuts in screw-nut assemblies
- for suspension or fastening the stamping itself
- to lighten the part
- to permit nesting of workpieces in secondary, forming or assembly operations
- to hold the part in plating, painting, heat treating and other production operations
- to allow passage of air, oil, water or other gases and liquids
- to control resonance and eliminate vibration



needed. Normally this problem is handled by punching a slightly undersize hole and reaming to size. Sometimes internal shaving dies are employed.

Reaming allowance depends on hole size and method used to actuate the reamer. With machine reaming, allowance should be from 0.005 to 0.010 in. With hand reaming, 0.002 to 0.003 in., is sufficient.

Solving alignment troubles

Considering the difficulties in hole punching, alignment holes can present particular problems. This is especially so if one stamping is to be aligned with another, rather than a bulkier part such as a machined casting. One simple way of handling the situation is also inexpensive and comparatively free of design difficulties.

On one stamping, punch several carefully located holes. In the other, exactly matching dowel extrusions are pressed. The type of rather high alignment precision possible is illustrated in Fig. 15.

Screws or rivets should not be employed for alignment purposes. Clearance holes required for easy introduction of fasteners are too large for any pretense at accuracy.

Lightening holes (Fig. 16) are an easy answer to weight limitations. They rarely present problems save where part strength is involved. Even in those cases, proper location of holes can most often remove metal without adversely affecting overall strength. Where this is not easily accomplished, the metal section involving the hole may be strengthened by embossing or flanging. Strength increase is appreciable.

For all metals—

Quality Control Travels With Portable Tester

◆ It's 21 lb of quality lab in a single package—ready to go where it's needed, when it's needed . . . This new electronic tester checks both ferrous and nonferrous metals with equal dependability.

◆ Easy to use, its versatility can be put to work wherever an inspection problem exists . . . Capable of sorting metals, it can also spot differences in hardness, heat treatment, metallurgical structure—even plating adhesion.

◆ A MAJOR ROADBLOCK in the path of shop quality control is the fact that most test equipment is heavy and cumbersome. It's a condition that tends to restrict all testing to a laboratory area.

Unfortunately, it leaves most shop personnel with two difficult alternatives. They can forget testing altogether—and sacrifice quality. Or they can tote parts to the lab from scattered points throughout the shop — and sacrifice valuable time and operating efficiency.

From the shop standpoint, it's not a happy prospect. But since most shops insist upon some reasonable control of quality, a satisfactory solution is a "must."

A new electronic tester—the "Metal Monitor"—might be the answer. It's portable, relatively lightweight (21 lb), and extremely versatile. Unlike certain other electrical testers, it is equally capable of checking either ferrous or nonferrous materials.

Test by comparison

Introduced at the recent ASTE convention the new tester can identify metals by comparative testing with known samples. This means it can sort mixed metals—but not only on the basis of chemical composition. Differences in hardness, heat treatment, metallurgical structure, uniformity, plating thickness—even plat-

Casting quality is readily checked on the shop floor, saving shop time and wasted motion.

Here's What Metal Monitor Can Check—

CHEMICAL COMPOSITION
HARDNESS
HEAT TREATMENT
METALLURGICAL STRUCTURE
UNIFORMITY
PLATING THICKNESS
PLATING ADHESION

ing adhesion can also be determined — and quickly.

The Metal Monitor, manufactured by Brush Electronics Co., a division of Clevite Corp., Cleveland, is sufficiently sensitive to detect a difference of 0.01 pct carbon. Yet, its usefulness is not restricted to the lab. Its ease of operation makes it especially suitable for shop needs.

The new tester operates on the principle of the so-called "thermocouple effect." Essentially it takes advantage of the electromotive force produced by the joining of two dissimilar metals. The principle isn't new, but the Metal Monitor claims to be the first instrument to make use of it for identifying unknown metals.

Metal contact generates voltage

Operation of the tester is fairly simple. An electrode with a built in self-heating element makes contact with the metal to be tested. The contact of the two metals generates a voltage. The voltage, in turn, is amplified and sent along to an indicating meter. The reading obtained is then compared to that produced by samples whose composition and metallurgical characteristics are known.

The fact that the tester is portable is one of its outstanding features. It's a cinch to operate. No elaborate training or technical education is required in order to get satisfactory results. Its simplicity is especially valuable in shops where technical personnel are scarce or nonexistent.

The use of the tester need not be restricted to a single department or location in the plant. With a proper set of standards, it can be used satisfactorily in rough stores heat treating, machine shop, assembly line, plating room, or final inspection. Non-destructive, it can check up to 3000 pieces in an hour. Contact area on the test piece is very small, making the instrument suitable for finished surfaces.

In rough inspection, new tester is being used to check incoming materials for identification.

Left: **HAND ASSEMBLY** operations on mercury batteries for radios are eliminated with this automatic assembly machine. Machine is in production use; turns out more than 15-thousand batteries per shift.

Below: **WITHOUT TOOLING**, basic machine looks like this. Wide variety of products can be assembled with the machine, after proper tooling modifications.

Multi-Purpose Machine Does Fast Assembly Job

◆ AUTOMATIC ASSEMBLY machines are usually designed and built for a specific job.

This one's different. Called the Multra, the new, multi-purpose machine is currently kept busy turning out from 15,000 to 30,000 mercury batteries per 8-hour shift, at the North Tarrytown, N. Y., plant of P. R. Mallory & Co., Inc. But it could as easily be used for assembling other products. A few hours for switching tools would complete the changeover.

Handles varied chores

All battery operations that would normally require a human operator are automatically handled. The machine feeds, sorts, sizes, forms, orients and inspects five different battery parts. These include such varied forms and materials as metal cylinders and caps, felt absorbent, neoprene grommets, pressed metal and a liquid electrolyte which the machine meters into the battery assembly.

The 7000-lb machine carries battery sub-assemblies from one work station to the next, as parts are inserted or work is performed. Parts feed from work nests. These are located at work stations around the machine. The machine can be positioned with an index accuracy of ± 0.002 in.

Space is provided around the 6-ft diam table for 16 tooling stations, although not all these are used for the battery assembly operations.

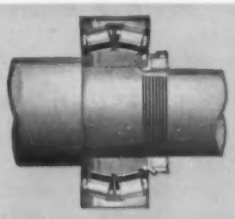
In case of mulfunctioning, or failure of a station to feed a part, operations cease. A feedback system takes over and the particular sub-assembly with the part missing is rejected at a later station. Meanwhile, no further parts feed into the machine until the malfunction is corrected.

The mercury batteries produced are for use in portable radios. Several additional automatic assembly machines are on order from Multra, a subsidiary of Barnes Engineering.

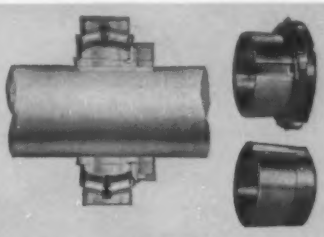
MORE FACTS on why more and more leading manufacturers choose Link-Belt bearings

ALLIS-CHALMERS MOTOR GRADER capitalizes on the ability of Link-Belt self-aligning roller bearings to handle high shock loads.

FREE-ROLLING — SELF-ALIGNING. Spherical inner ring is free to align in any direction. Load is distributed over entire roller assuring full load capacity. Destructive edge loading cannot occur.



DIRECT SHAFT MOUNTING with bearing being pressed or shrunk on the shaft. Especially desirable to achieve maximum economy on production applications.



ADAPTER MOUNTING permits use of commercial shafting without machining. Easy installation and removal of adapter-type bearings are provided by the tapered sleeve, locknut and lockwasher.

Builders of industry's heaviest equipment

choose this self-aligning roller bearing for toughest applications

You're in company with blue-chip machinery makers when you specify high-capacity Link-Belt self-aligning roller bearings. Wherever tough-duty equipment calls for self-contained, pre-adjusted bearings and simple mounting, you'll find them on the job . . . handling heavy radial and thrust shock loads.

These self-aligning roller bearings have internationally standardized boundary dimensions and are available everywhere. Link-Belt also makes industry's most complete line of ball and roller bearing blocks. This includes pillow blocks plus flange, flange cartridge, cartridge, take-up and hanger blocks. Ask any one of the 40 Link-Belt offices for data Book 2550 or an authorized stock-carrying distributor.

LINK-BELT

Ball and Roller Bearings 13,389

Bearing boundary dimensions are international standards for Series 22200 and 22300—22500-A and 22600-A.

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New Technical Literature:

Catalogs and Bulletins

Pump motors

Containing 66 colored illustrations and technical drawings depicting features and applications of various types of vertical turbine pump motors, a new brochure is ready for distribution. It describes hollow shaft grease- and oil-lubricated motors in sizes from 1½ to 400 hp; also single phase designs up to 7½ hp, and totally-enclosed types up to 150 hp. Various arrangements of bearing settings are presented; also a design of backstop to prevent backspin of the pump shaft. *U. S. Electrical Motors, Inc.*

For free copy circle No. 1 on postcard, p. 121

Electric brake

A technical bulletin describing features and operating characteristics of the new Series E electric brake has been released. According to the manufacturer, the new brake incorporates unusual design features of special interest to users of magnetic disk type brakes. These features are fully described and illustrated in the 8-page brochure. *Star-Kimble Motor Div., Miehle Printing Press & Mfg. Co.*

For free copy circle No. 2 on postcard, p. 121

Lift truck

Bulletin 551-3 on an electric hi-lift platform truck has recently been released. This bulletin features Model PO-40, a walking type, battery-powered unit designed to speed the moving and stacking of skids, box tops, cases, crates, bales and many loads that can be carried on a platform. This truck is described as unique in its compact design, providing a short turning radius and smooth, free steering. It is presented as an ideal truck for maneuvering in close, cramped areas. The bulletin contains full specifications, and the features of Model PO-40 are shown in close-up illustrations. *Barrett-Cravens Co.*

For free copy circle No. 3 on postcard, p. 121

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 121.

Controlled chucks

This brochure discusses "Selectron" units for automatic control of magnetic chucks. It gives details concerning the method of obtaining dc power from the rectifier and the principle involved in the infinitely variable control of holding power and the automatic demagnetization of chuck and work. A variety of installations are pictured and various capacity ranges of the Selectrons are given. *The DoAll Co.*

For free copy circle No. 4 on postcard, p. 121

Conveyor systems

Announced as available is a 20-page catalog on manually operated conveyor systems. The catalog (453) gives complete information and specifications on hand pushed trolleys, traveling bridge cranes for trolley conveyor systems, stub switches, as well as the engineering data for installation and operation. *Jervis B. Webb Co.*

For free copy circle No. 5 on postcard, p. 121

Work positioner

Announcement is made of a 4-page, 2-color bulletin on a company's new master spacer for indexing work for a variety of machining jobs. Illustrated with cutaway view, halftone cuts, and dimensional diagrams, the new bulletin gives detailed information on specific master spacer applications, including milling, drilling and inspecting. *Erickson Tool Co.*

For free copy circle No. 6 on postcard, p. 121

General catalog

A revised catalog, detailing one firm's line of polyethylene and polyvinyl chloride sheet, bars, rod and blocks, moldings and weldments, plus its welding and spraying equipment, has just been issued. The new literature devotes space to a recently introduced powder fluidizer, specifically designed for coating small objects with polyethylene and other fusible powdered materials. This section likewise details the complete line of powders used with this new process. In the catalog specifications are given in chart form and product classifications are arranged with text and other information supplementing the illustrations. *American Agile Corp.*

For free copy circle No. 7 on postcard, p. 121

Automatic lubricators

Two-page, 2-color service instruction sheet describes the design and operation of a series of high pressure automatic lubricators. The sheet describes Type A lubricators, which are gear pumps driven through internal reduction gears by the machine on which they are used, or by a small motor. Sections in the sheet describe the type of oil to be used, operation, starting a new machine, maintenance, service and service parts. A schematic drawing illustrates component parts of the lubricator assembly. Sixteen types of one firm's lubricators are also shown in photographs. Four specification tables detail hose fittings, tubing, compression fittings and junctions used in these lubrication systems. *Bijur Lubricating Corp.*

For free copy circle No. 8 on postcard, p. 121

Centrifugal pumps

Just issued, a centrifugal pump and valve bulletin gives technical data on one firm's various sizes of pumps and valves. Included in the 20-page bulletin is a complete description with photographs, dimension drawings, data tables and performance curves of their pumps. Also included is a description of the various types of valves manufactured by the company. *McNally Pittsburg Mfg. Corp.*

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Because they are produced by *turning*, rather than by less accurate methods, Fischer brass and aluminum nuts set new standards of precision and quality that speed assembly operations . . . reduce costs. Uniformly accurate, Fischer nuts are tapped square with the face to Class 2 tolerances . . . countersunk on both sides . . . burrless . . . cleaned and degreased before delivery.

You pay no premium for Fischer *precision-turned* nuts . . . they're priced no higher than those made by less exact methods.

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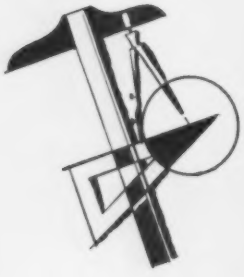
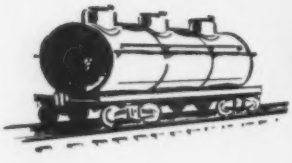
Representatives located in major cities throughout the United States will call at your plant, look over your corrosion problems and prepare suggestions for solving them.



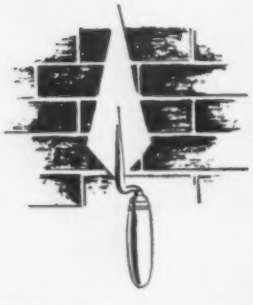
ENGINEERING DESIGN

Engineering facilities at the Atlas home office are geared to provide recommended design features, based on a quarter century of experience in the field.



HIGHEST QUALITY MATERIALS

Atlas time-tested corrosion proof materials of construction are your assurance of long term service. The controlled manufacture of Atlas materials maintains the highest standards of quality.



COMPLETE CONSTRUCTION FACILITIES

The most complete corrosion proof construction facilities available are maintained by Atlas. Shop and field fabrication, installation and follow-up service assures you of complete interest in your problems.

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ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

FREE TECHNICAL LITERATURE

Electric furnaces

Catalog reference C-55-3 is a leaflet on a series of high temperature electric furnaces. Applications, such as metallurgical and testing laboratories and processes involving hardening (high-speed steel), annealing malleability, drawing, tempering, stress relieving and silver soldering, are discussed. *Auto Control Laboratories.*

For free copy circle No. 10 on postcard, p. 121

Tooling resins

New chart, listing the physical properties of tooling resins—including casting and laminating materials—offers basic information required for the selection of epoxy resins for tooling, casting, laminating and gel coating purposes. *Furane Plastics, Inc.*

For free copy circle No. 11 on postcard, p. 121

Crane classification

Crane service classes as established by NEMA (National Electrical Manufacturers Association) are detailed on a new classification card. These are: stand-by service, light industrial service, regular industrial service, continuous handling service, and steel mill and heavy industry service. *Ederer Eng. Co.*

For free copy circle No. 12 on postcard, p. 121

Mine service pipe

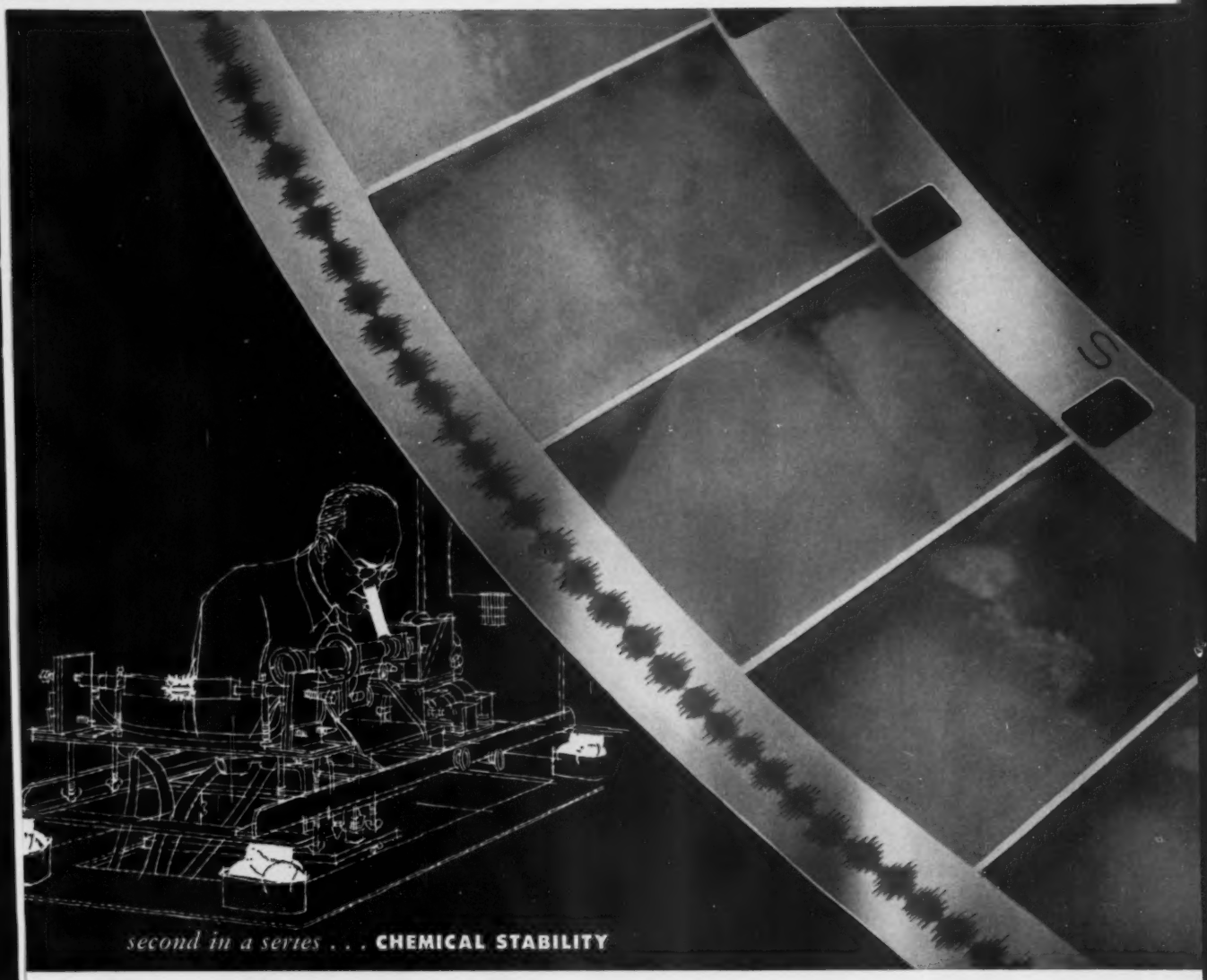
"Transite Mine Service Pipe with Ring-Tite Coupling" is the title of a new 12-page, illustrated brochure. The booklet suggests a range of uses for this asbestos cement pipe, describes how it is made, and gives case histories of various installations. *Johns-Manville.*

For free copy circle No. 13 on postcard, p. 121

Limit switches

Seven models and 19 contact arrangements of heavy duty limit switches are described in Catalog No. 955. Purchasing and specification data on each of these switches is given including information on housings, wiring diagrams, ampere ratings, operating data and electrical characteristics. In addition to buying information, this 12-page catalog also describes features and operating advantages. *R. B. Denison Mfg. Co.*

For free copy circle No. 14 on postcard, p. 121



Comparative stability of MONOFRAX® fused cast refractory (left) vs. fireclay (right) . . . under attack by molten glass, as viewed through the high temperature microscope — one of Carborundum's most useful test facilities. (16 mm. frames shown are not consecutive.)

Unusual Properties of Refractory Materials

Chemical stability — Even under high temperature attack by gases, acids, corrosive solutions, molten salts and molten metals — the chemical stability of CARBORUNDUM'S super refractories enables them to fill industrial requirements that other refractories are unable to meet. For this reason, they are being used with increasing frequency in critical applications: i.e. as linings in controlled-atmosphere furnaces, in the production of muriatic acid, as radiant tubes, in the submerged combustion of liquids containing free acid — such as mixed chlorides and sulphates of iron, zinc, mercury and tin; in retorts for reducing and refining zinc, melting copper alloys and for hundreds of similar applications.

CARBORUNDUM'S laboratories are constantly developing new super refractories to meet specialized application problems. Current research projects include refractory materials for guided missile components, for atomic reactors, and for applications where wear and corrosion are unusually severe.

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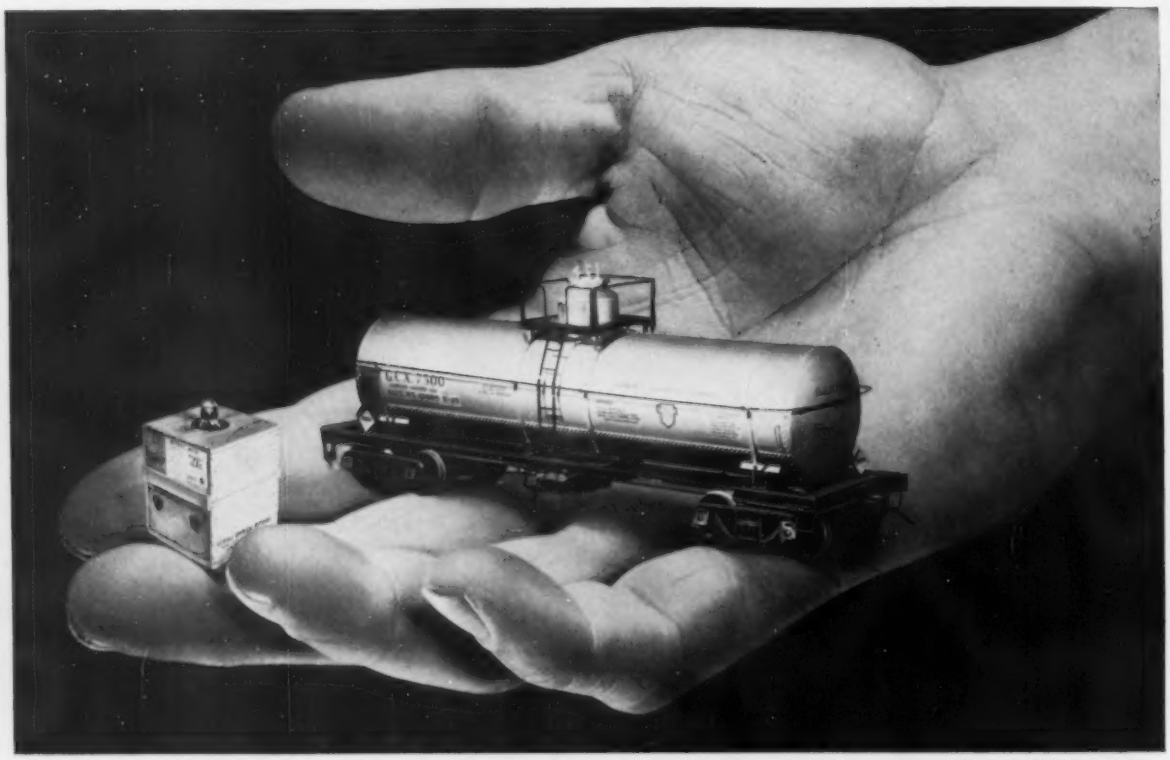

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This section starts on p. 116

Ethanolamines

Ethanolamines are discussed in a new 54-page technical data book. This book fully describes monoethanolamine, diethanolamine, and triethanolamine listing their applications, chemical and physical properties, physiological properties, shipping specifications, handling and storage features, and a comprehensive bibliography. Complete analytical procedures to determine specific gravity, weight, boiling range, color and odor are given. Graphic illustrations include data pertinent to viscosities, vapor pressure, densities, freezing curves and other characteristics. The ability of the ethanolamines to undergo reactions common to both the amines and the alcohols makes them important chemical building blocks. *Copies of this book may be obtained by writing on your letterhead to Allied Chemical & Dye Corp., Nitrogen Div., Dept. EA, 40 Rector St., New York 6.*

Plating filters

A line of plating solution filters are described and pictured in a 4-page folder. Features of the units—such as self priming, incorporation of back washing, stainless steel construction, and portability—are detailed. *The Udylite Corp.*

For free copy circle No. 15 on postcard

Dust collector

A packaged type dust collector designed for broad use in industry is described in Bulletin 172-CFF. Operating features are described and diagramed and a statement from a testing laboratory is offered on tests made with the unit. *Green Fuel Economizer Co., Inc.*

For free copy circle No. 16 on postcard

Clamps and handscrews

Detailing at a glance one company's full range of clamps and handscrews is a 20-page, pocket size booklet. The booklet includes diagrams, specifications and photographs of the products in use. Clamps shown include special purpose items such as welders' clamps, drill press clamps, heavy duty bar clamps and the firm's "glue-shield" handscrews whose soft metal jaw inserts reportedly protect fine wood and metal finishes. *Wetzler Clamp Co.*

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Fittings

Twelve-page, handy pocket catalog contains basic information on forged steel screw-end and socket-welding fittings, forged stainless and alloy steel fittings, 150 lb stainless fittings, unions and special fittings, as well as a line of hydraulic pumps and jacks. Size ranges, types, materials of construction and design features are included. *W-S Fittings Div., H. K. Porter Co., Inc.*

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Hardness tester

Automatic zero setting, with a read-on-sight 4-in. dial indicator built in—new position for load-release and load-removal levers near hand wheel—and a resulting speed of operation up to 400 tests per hr are among the features presented in Bulletin No. A-12 on a Rockwell hardness tester. Details of the new lever positioning are included in the new manual, which also gives information on: standard equipment of each machine, optional extras, bench space requirements, and weights. *Gries Industries, Inc.*

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Explosion-proof motors

Company line of explosion-proof motors are described and illustrated in a 4-page folder. The units —recommended for use in hazardous areas such as gaseous locations and those involving explosive dust and grain dust — are available in standard, geared or variable speed models. *Sterling Electric Motors.*

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Grinder

"Visible grinding," a new grinding method described as permitting the operator to see right through the grinding wheel, is described in an attractive 4-page brochure. Included are operating instructions and parts lists, as well as a complete description of this new grinder. *Carl Hirschmann Co.*

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Presses

One firm's line of bodymakers, power formers and duplex seaming presses for medium and high speed can making lines is described in a new 16-page catalog. The catalog illustrates and describes an ultra high-speed bodymaker described as capable of 450 cans per minute; high and medium speed bodymakers for round, square and rectangular cans; and a high-speed bodymaker for dry packages. Also included are forming and seaming machines for round, square and oblong bodies. Design and construction features of all machines are described and dimensions are listed. *E. W. Bliss Co.*

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Solder alloys

Bulletin that lists and describes the application of new special solder alloys for cast iron, aluminum, die cast and stainless steel has been published. Each new solder alloy was designed for special-purpose soldering. In addition to a description of each solder and the forms in which it is available, the bulletin gives step-by-step procedures for proper use—preparation of work, selection and application of flux, type of heat to use, tinning, wiping and cleaning of parts. *Anchor Metal Co., Inc.*

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Vulcanized fibre

General folder of product information is made available by a maker of vulcanized fibre sheets, tubes, rods and fabricated specialties. Space is given to dimensions and tolerances, engineering data, weight formulas, as well as physical, electrical and chemical properties. *Continental-Diamond Fibre Co.*

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Steel shelving

Klip-Bilt shelving, a new boltless steel shelving, is the subject of a new 12-page illustrated color catalog just released. The catalog contains a comprehensive discussion of this Klip-Bilt principle, showing how the shelving may be erected, as well as a detailed survey of the various models of open, closed, and ledge type shelving available. Component parts and accessories necessary for construction are shown in detail, along with several other types of special and high strength shelving. *Frick-Gallagher Mfg. Co.*

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Stamping

Stamping operations at Republic Steel's Pressed Steel Division are described in a 16-page, 2-color brochure. It shows in detail the facilities Republic can offer on contract stamping. The brochure includes a handy tabular page listing pressroom equipment available and showing its sizes and capacities. *Republic Steel Corp.*

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Stainless steel wire

Types of stainless steel wire are described in a new bulletin. It includes the analyses, tensile strengths, physical properties and gages of 12 types of stainless wire most generally used in the manufacture of wire products. Specifications for all of the wire types are given in easy-to-read chart form. Each of the wire grades covered is described in terms of distinctive characteristics and suggested end use. The entire grouping is broken down into austenitic, martensitic and ferritic classifications. *Webb Wire Div., Carpenter Steel Co.*

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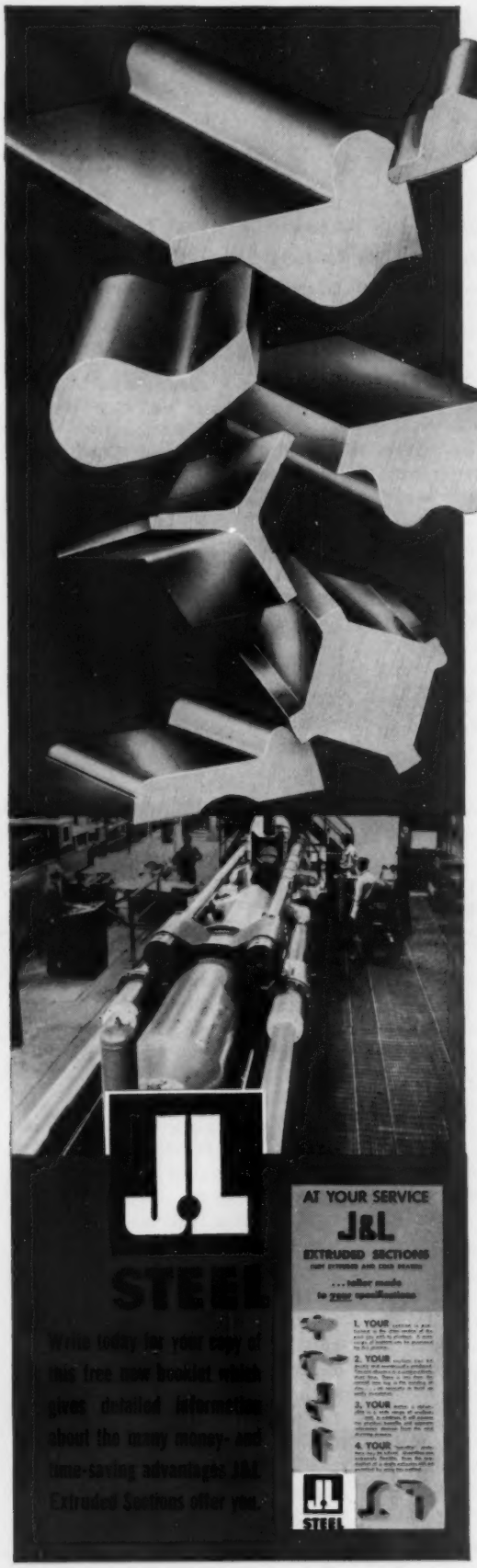

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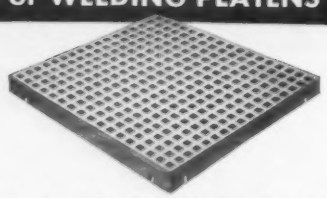

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ALLOYS: New Building Steel

Employed in TV tower, this new T-1 alloy steel is called stronger, more weldable and corrosion resistant . . . Its use lead to 30 pct reduction in tower structural weight.

Use of "T-1" steel played a significant part in the breakthrough in the height barrier of television towers, according to engineers of Blaw-Knox Co., Pittsburgh tower builders.

They cite metallurgical research by United States Steel Corp. resulting in introduction of their USS constructional alloy "T-1" steel, coupled with design study by Blaw-Knox as producing the technological advances necessary for construction of a new TV tower at Nashville, Tenn.

Strength Limited Height

Practical limitations to significant increases in the height of towers, which now range up to 1600 feet, previously were imposed by the basic strength of steel. The new tower, the world's third in height at 1379 ft when completed, will be the first to be constructed principally of USS "T-1" steel.

This alloy steel is described as approximately three times as strong as structural steels used in many of today's modern skyscrapers. Also, the steel is reportedly readily weldable and has the added advantage of having four times the atmospheric corrosion resistance.

Costs Cut

Because "T-1" is much stronger than carbon steel, state Blaw-Knox engineers, each component member of the tower will be smaller in diameter, thus exposing less tower surface to the heavy winds for which they must be designed.

Shipping charges, erection costs, smaller guy wires to support the tower in place and less concrete for anchors and supporting base, are all items described as substantially reduced through use of "T-1." In evidence, Blaw-Knox says the steel in the tower will reduce weight by over 100 ton, or 30 pct of the total weight which would be required with ordinary structural steel.

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 121. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Forming:

Tubing specs 20 years old still successful.

A set of specifications for a small diameter copper tubing for use in fire alarm systems, written 20 years ago by a then newly established tubing manufacturer and put into standard production at that time, have with their success remained unchanged to the present.

The manufacturer, Superior Tube Co., Norristown, Pa., had been in business for only a year when, with its new customer, The American District Telegraph Co., New York, it jointly drew up specifications for the tubing.

At that time most of Superior's small tubing production was nickel tubing fabricated into cathodes for electron tubes. But the telegraph company felt that if the manufacturer could produce to the exacting specifications required for cathode tubing it could meet the rigid standards for pneumatic fire detecting tubing.

Therefore they asked Superior to write its own specifications and then to meet them.

They stated the problem to Superior engineers who set out to produce the tubing and learn from experience just how perfect standard production tubing could be made.

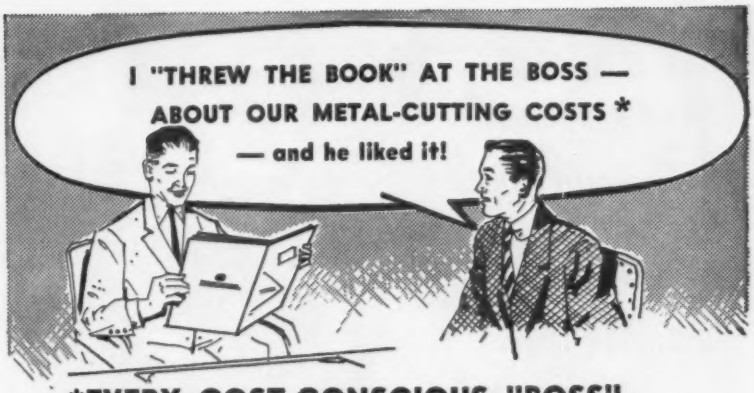
The automatic fire alarm — known as the Aero system—employs continuous lengths of deoxidized copper tubing attached to the ceilings of areas to be protected. Both ends of the tubing connect with the detector unit. When a fire starts, the rising temperature expands the air in the tubing, creating a pressure which deflects a flexible diaphragm. This closes an electric circuit in the detector unit, which initiates the fire alarm.

Dry nitrogen, at pressure, tests tube for leaks.

Operation demands that the tubes be free of leaks which might permit expanding air to escape before enough pressure is built up to trip the alarm. The inside of the tubes must be free of any liquid or other foreign matter that might interfere with pressure transmission. Finally, the inner diameter of the tubing must be held to very close tolerances to assure uniform operation.

Difficulties Outlined

By recommending the tightest practical specifications, Superior might have had an initial competitive advantage. At the same time the specifications imposed unusually difficult conditions on Superior's production and inspection departments. A brief description of the manufacturing process il-



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lustrates some of these:

The raw copper stock—seamless extruded tubes — is cold drawn to 0.080-in. OD, plus 0.003, minus 0.000 and 0.050-in. ID, plus 0.003, minus 0.001. Annealing is done in controlled atmosphere furnaces completely free of oxygen and sulphur. Inside and outside surfaces of the tubing must be smooth and free of all imperfections.

Single lengths of tubing—100 ft or longer—are then silver brazed into lengths of 500, 1000, 2000 or 5000 ft, as ordered. Before joining, however, each length of tubing is tested for obstructions by blowing it out with dry air or nitrogen. It is then tested for leaks at 1250 lb psi minimum for a period of at least one minute. Extreme care is taken to prevent any liquid or other foreign material from entering the tubing.

Soldering is done with a brazing alloy containing a minimum of 50 pct silver. The solder flow is limited to 1/32-in. To obtain a uniform flow of solder around the tube, it is supplied in the form of a wire ring which is slipped over the joint prior to heating.

Oscilloscope Testing

As an extra precaution, Superior tests the joined tubing with an oscilloscope which discovers turn-ins and similar defects which do not show up in leak tests at the mill but which may develop leaks when the tubing is bent during installation. This unit immediately shuts down the reeling machine if a defect appears, and the operator quickly locates the defect with a magnifying mirror and removes the section of tubing.

A third test is made on completed reels of tubing by introducing dry nitrogen at 200 lb pressure in one end with an accurate pressure gage at the other. Each reel is tested one-half hour for every 500 ft of tubing in the reel. It must show no pressure drop during that time. This test not only checks for leaks but also makes sure that the tubing has no obstructions. After testing, the

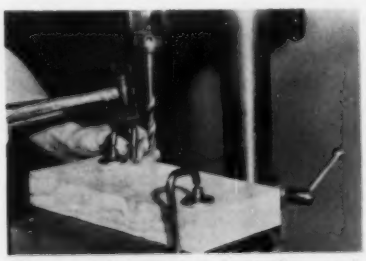
ends are sealed airtight with the dry nitrogen trapped inside. The customer looks for a spurt from his trapped nitrogen when putting the tubing into use.

Before shipment, samples from each reel are sent to the laboratory for tensile tests. All splices must withstand a direct pull of 90 pounds without parting or the entire reel is rejected.

Methods:

Self-locking clamps simplify drill press workholding

New patented self-locking "J-Lock" workholding clamps designed to simplify workholding on a drill press have been introduced by Rockwell Mfg. Co.'s Delta Power Tool Div. of Pittsburgh. The clamp is described by the manufacturers as a simple, speedy, positive hold-down device suitable for use with larger industrial drill presses or in home workshops.



Tap of hammer installs and locks clamps in place.

Reported chief advantage of the new clamps is the ease with which they can be used. A tap of the hammer installs and locks them; another tap loosens and removes them.

Designed to hold material up to 2½ in. thick, the clamps are mentioned as useful for holding in place long workpieces laid diagonally across the work table.

Clamps are inserted in holes drilled at both ends of the table, the long leg of the inverted "J" entering the hole at an angle, the short leg pinning the work to the table.

Logan Roller Conveyor is ideally adapted to progressive machining operations. This line handles bearing caps for diesel engines. Irregular shaped parts ride easily on pallets.

"Who uses it?" . . . is one of the first questions asked by the buyer of plant equipment. Logan's answer is to point to the large list of blue chip industrials, large and small, who employ Logan Conveyors as part-of-the-process in their manufacturing establishments. Logan equipment increases production tempo, enlarges capacity, speeds deliveries, conserves manpower, decreases labor turnover.

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Testing:

NBS unit tests abrasion of porcelain enamels

A simple, rapid device for determining the abrasion resistance of porcelain enamels has been developed at the National Bureau of Standards. The instrument is described as providing a reliable means for testing enamels having different types of finishes, including "orange peel" and wavy surfaces.

While the abrasion tester was designed primarily for porcelain enamels, it can be used for determining the wear resistance of such other materials as highway paints, plastic and fibrous materials, and organic finishes. The instrument and test method were developed by the Bureau for the Porcelain Enamel Institute.

Abrasive Used

The instrument consists essentially of a motor-driven table gyrating in a horizontal plane at 300 rpm. The table moves parallel to itself, and describes a circle ⅞ in. in diameter. The table is driven by a ¼-hp synchronous motor, and testing time is accurately controlled by an electric timer. Nine specimens, 4½ in. sq., can be fastened to the table for simultaneous testing.

A specimen is placed in one of the nine available positions on the table and secured with a rubber-coated aluminum retaining ring. An abrasive charge consisting of 3 g of abrasive grit, 175 g of stainless steel balls (5/32 in. diam), and 20 ml of water is poured into an accessory hole in the top of the retaining ring. The apparatus is then set to oscillate for the required time. The effectiveness of the abrasive is increased by the motion of the steel balls on the moving specimens.

Two Methods Described

Two test methods have been devised; one for determining surface abrasion resistance and the other for subsurface abrasion resistance.

The surface abrasion test is used when appearance is the main consideration, but the subsurface test method is followed when protection of the underlying metal is the more

important. In the first method, Pennsylvania glass sand, between 70 and 100 mesh, is used in the abrasive charge, and the test is run for five minutes. The specular gloss is measured before and after the test, and the percentage retained gloss at 45° is the surface abrasion index.

For determining subsurface abrasion, a coarse fused alumina grain is used for the abrasive grit, and the test is operated for 45 minutes. The slope of the portion of the abrasion time-weight loss curve between the 15- and 45-minute points is taken as the abrasion index. The specimen is weighed at the end of each of three 15-minute abrasion periods; a fresh charge is inserted at the beginning of each period.

Fabricating:

New type sheet steel dome saves on trusses, metal

The circular styling auditorium will be the focal point at the new General Motors Technical Center in Detroit. It contains an unusual welded spherical dome. This dome design, utilizing no trusses but only thin sheet steel stiffened by a network of steel angles, provides a clear exhibit area having a diameter of 186 ft to the inside of the outer and only columns.

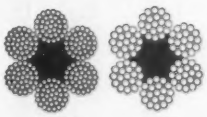
Dome shell plates are stiffened by steel angle network.

Design of the roof permitted its construction at a thickness and weight substantially below those of similar structures. Credit for the structural design goes to Chicago Bridge & Iron Co. and the architects, Saarinen & Associates. Chicago Bridge & Iron did the all-welded structural steel work.

The main dome, with a spherical radius of 107 ft 4 7/16 in., is made

WHEN WIRE ROPE requires extra flexibility and must also lift or pull heavy loads, an unusually pliable, strong rope is needed. Rope jobs like paver skip hoists, overhead cranes, large shovel and dragline hoists, and sawmill carriages demand these qualities. That's where the use of 6 x 37 Red-Strand wire rope saves time and money.

Where will 6x37 Red-Strand improve your wire rope service?



Look at a cross section of 6 x 37 wire rope. You see three rings of small, uniformly sized wires in each strand. This differs from a rope construction like 6 x 19, which contains fewer and larger wires.

The *smaller size* wires make 6 x 37 more *flexible*. The *larger number* of wires maintains rope *strength*.

Would this combination improve your wire rope service? Would it solve a problem for you?

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COMPONENT FABRICATION

by KIRK AND BLUM

Put your sheet and plate fabrication problems up to specialists. Whether you require ten or ten thousand components, Kirk & Blum has the men, machines, methods and materials to do the job quickly and economically.

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KIRK & BLUM

SHEET METAL FABRICATION

up of shaped shell plates of the so-called "orange-peel" type welded in four circumferential rows. The lower row next to the box girder has 80 plates, the second row 60, the third row 48, and the top row 24.

Plate thickness is ⅜ in. If plates were plain, the allowable external load would be 22 lb per sq ft, of which the plate itself weighs 16 lb. But stiffening angles on the underside of the plates raise the allowable load to 55 lb per sq ft with a factor of safety of three.

Stiffeners are both radial and circumferential. The radial stiffeners are 6 x 3½ x 5/16 or 5 x 3 x 5/16 angles located 4 in. from one of the radial edges of each plate. Ring stiffeners are made of 6 x 4 x ⅝ angles for the outermost row and 6 x 4 x ½ angles for the other two rows. Stiffening rings are about 27 ft apart measured along the arc. All angles are welded with webs rather than flanges against the plates to increase the stiffening effect.

Rolled for Conformity

The ring stiffening angles were all rolled to the shape of a great circle with a radius equal to the radius of the dome. This was done so any stiffener could be made to fit any shell plate by a single curvature rolling. If angles had been rolled to form perfectly circular rings around the dome, they would have had to be rolled with a double curvature to fit the double curvature plates. The result of this technique is that ring angles, instead of being circular, are polygons of 40, 40, and 24 sides.

The shell plates were joined by butt-welded seams with a shrinkage allowance of 1/16 in. Welding the radial angles to the plates with a ¼-in. continuous fillet weld caused the plates to shrink 1/16 in. in width. No allowance was provided to compensate for this shrinkage. Instead, the closing plate was made 3 in. wider for makeup.

Butt Ends Tack Welded

In construction, four plates at a time for the first course were preassembled on cradles, butt welded,

and had their stiffening angles attached. The assembled sections were then erected and welded in place. In following courses, the radial stiffening angles were tack welded during preassembly and finish welded in the air after the plates had their butt joints fitted. This change in practice produced a smoother surface as it avoided the bend in each plate that had resulted in the first course from welding the radial angle to it solidly during preassembly.

Handling:

Automatic scrap baler licks storage problem

A manufacturer of wire cloth products, faced with a problem in scrap metal accumulation, solved the difficulty with the installation of a recently developed automatic scrap metal baler. This unit was the Scrap-O-Matic manufactured by Balemaster Div. of the East Chicago Machine Tool Corp., of East Chicago, Indiana.

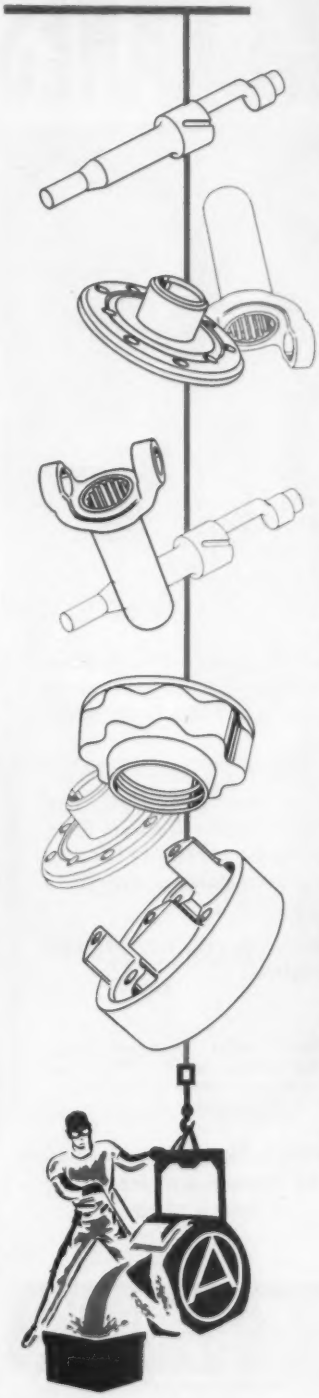
The firm with the problem was Wire Cloth Products, Inc., Bellwood, Illinois. This company, a manufacturer of such products as strainers and filters for commercial and aircraft industries, found itself with a high percentage of scrap brass, aluminum, bronze, galvanized cloth and other metals —even including light gage metal stampings.

One man loads scrap wire into loading chamber of baler.

The large accumulation of scrap from a single day's operation created a serious situation and was affecting completion schedules and working conditions even though every effort was made to reduce it by standard methods.

Wire Cloth found the answer in

designed to match your SPECIAL NEEDS



Saving your dollars with good, accurate castings is a 67-year old habit at Albion Malleable Iron Co.

Devising ingenious ways to shorten time between idea and delivery, creation of new designs, engineering new methods for more rapid, economical manufacture and delivery—all are routine benefits you realize when you specify AMICO—the experienced source that guarantees higher quality.

Remember, too, that Albion's ferritic and pearlitic malleable castings offer a new freedom of design, the elimination of excess metal for lower finishing costs. They afford unusually high wear resistance with excellent bearing properties. Also, maximum rigidity, prolonged fatigue life and amazing yield strength. They have a fine uniform grain structure for mirror-smooth finishing qualities and are adaptable to localized hardening.

If you are interested in better castings — why not phone AMICO today — they'll be glad to show you how many ways good, accurate, low-cost casting can save your equipment dollars.

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ALBION MALLEABLE IRON CO.

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CRANES

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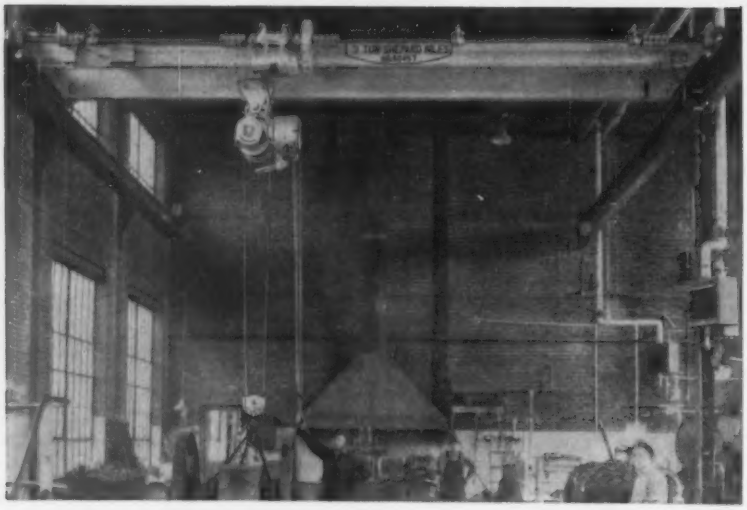
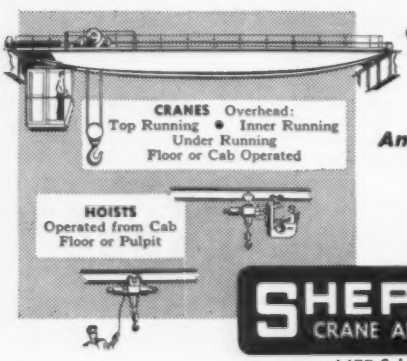


PERHAPS YOUR PLANT doesn't require a crane of double beam construction. Or possibly ceiling clearances would prevent its use. In either instance, a Shepard Niles Single Beam Crane might well be best for your use.

Shepard Niles Single Beam Cranes handle loads with precision, safety and at low operating cost. These cranes can be supplied with push button or pendant rope control for operation from floor, cab or remote location. Push-type or motor-driven trolley types of hoists, including close clearance units, are commonly employed on Single I-Beam Cranes.

Why not talk over your plant's load-handling requirements with an experienced Shepard Niles representative.



• Write today for latest Single Beam Crane Bulletin . . . and ask to have a representative call.

America's Most Complete Line of Cranes and Hoists Since 1903

SHEPARD NILES
CRANE AND HOIST CORPORATION
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the form of the new Scrap-O-Matic hydraulic briquette baling machine. Use of this unit resulted in the handling of scrap becoming an integral part of the regular production schedule. Where 100 lb of scrap had required space for 3 heavily loaded and difficult-to-handle barrels, that same 100 lb—baled into a metal briquette—used just 1 cu ft of storage space. Since the bale weighed only 50 to 100 lb, depending on the metal, it was easy to handle. And an added feature—segregation of the various metals—meant getting top prices for the scrap.

Labor involved was reduced so that one man, working only part time, was able to easily handle the entire scrap metal production in a normal day.

The Scrap-O-Matic is described as producing a briquette every three minutes, and has an eight hour shift capacity of as many as 140 briquettes, depending on the density of the metal being baled. The machine has only four operating controls and is designed for one man operation.

Education:

Metallurgic fellowship offer at Michigan State announced.

Establishment of a Graduate Fellowship in Metallurgy, the first in a new program, was announced late in March by the Drop Forging Association. Worth $2,000, this fellowship will be for the study of metallurgical aspects of closed die forgings at Michigan State University in the year 1956-57, according to the Association.

Funds for the grant were obtained by the Association acting as intermediary from four Michigan producers of forgings.

First of a Series

It is expected that this will be the first in a series of grants for fellowships in mechanical and metallurgical engineering. The program has a four-fold purpose: to give financial aid to engineering schools, to aid in relieving the

current shortage of highly trained engineers, to develop more knowledge about forgings and the forging process, and to stimulate interest in forgings.

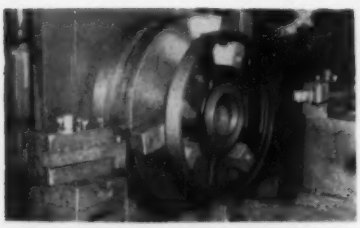
On the basis of experience obtained from the Michigan State fellowship, the Association hopes to obtain additional grants from Drop Forging Association members in all parts of the country, to be used to establish fellowships at engineering schools in the areas where the funds originate. The program is planned to expand to its full scope, covering all areas of the continental United States, by 1958-59.

Tooling:

Clamped insert method cuts changing time.

Clamped insert tooling — for longer tool life, quick changing and simplified maintenance — is resulting in a considerable reduction in tool changing down time and grinding costs for manufacturers, according to Kennametal Inc., Latrobe, Pa.

The firm cited, in particular, a textile machinery manufacturer who switched from standard brazed tip tools to Kennametal



Cast iron gear was machined with clamped tooling.

tooling — which was used for rough and finish straddle facing and chamfering 15⅜ in. OD x 1½ in. wide cast iron transmitter gears.

One two-tip brazed special tool had been used in the textile manufacturer's setup for finish facing one side and chamfering in a single pass. However, tool changing proved troublesome. Even with only slight wear on the

metal turnings reduction...

in a

BIG WAY

with the American ROLLING RING Metal Turnings Crusher

Especially Designed for . . .

- **Metal Scrap Yards**
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. . . Designed for clam shell bucket or magnet feed. Large capacities: 25 to 50 tons per hour.

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THAT PAYS OFF IN SAVINGS

Safe hoisting demands more than devices to protect man, load and hoist. Equally vital are *invisible values:* experienced engineering, careful selection of materials, precision manufacture and thorough tests.

The Series "600" 'Load Lifter' Electric Hoist has *two* powerful, automatic brakes. Each alone can hold the full load. Modern 'Load Lifter' Hoists were first to have safe 24 volts at the push buttons. Steel suspension, tough wire rope and non-fracturing load hook provide extra strength for heavy-duty service. All operating parts are enclosed, but the hoist can be serviced safely *in the air.*

Safety . . . quality . . . performance — the Series "600" 'Load Lifter' Electric Hoist is "okay on every count." It is fast — lifts 1000 lbs. at 30 FPM. Sizes: ½ and 1-ton. All types of suspension, including motorized trolley. *Call your "Shaw-Box" Distributor or ask us for Bulletin 408.*

'Load Lifter'® ELECTRIC HOISTS

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

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MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

chamfering tip, it had to be reground each time the facing tip was reground to maintain relationship of the tips.

Provide Eight Edges

The tipped tool was replaced with a special Kendex tool, utilizing two clamped turnover type square inserts which made possible indexing to a new cutting edge in seconds without checking the workpiece. The inserts provide eight indexable cutting edges —four on each side of the insert —and are interchangeable.

When all the cutting points had been used, the facing insert was switched with the chamfering insert—which cuts with the central portion of its cutting edge—and the cycle repeated.

The gears were cast iron with molybdenum. Feed was 0.014 ipr. Roughing was completed at 39 rpm and 157 sfm. Finishing was at 74 rpm and 298 sfm. Depth of cut varied from ⅛ to 3/32 in. roughing and was 1/32 in. for finishing.

Welding:

All-welded frames picked for indoor sports field.

Metal is making another important contribution to American life as it adds to the construction of a new structure on the campus of Ohio State University at Columbus. The welded, rigid frame structure,

This frame structure is for indoor sport arena.

200 x 400 ft, is the frame for an indoor area where the university's teams will practice without regard for rain, sleet or snow.

The building is a steel structure

with a clear span of 200 ft, consisting of 18 all-welded rigid frames. The 2-acre, dirt floor will be used for indoor practice of football, baseball and track. Welded construction was selected, according to the structural engineers, Barber, Magee & Hoffman, because it afforded the best answer to providing a clean, simple, economic design. The Lincoln Electric Company's new iron powder type electrodes made by the Lincoln Electric Co. of Cleveland were used in the fabricating.

Machining:

Hollow aluminum bar stock available.

Full-scale production of hollow aluminum bar stock has been announced by Harvey Aluminum Co., Torrance, Calif.

This hollow machining material is described as offering machine tool operators all of aluminum's favorable machining characteristics at a substantial saving.

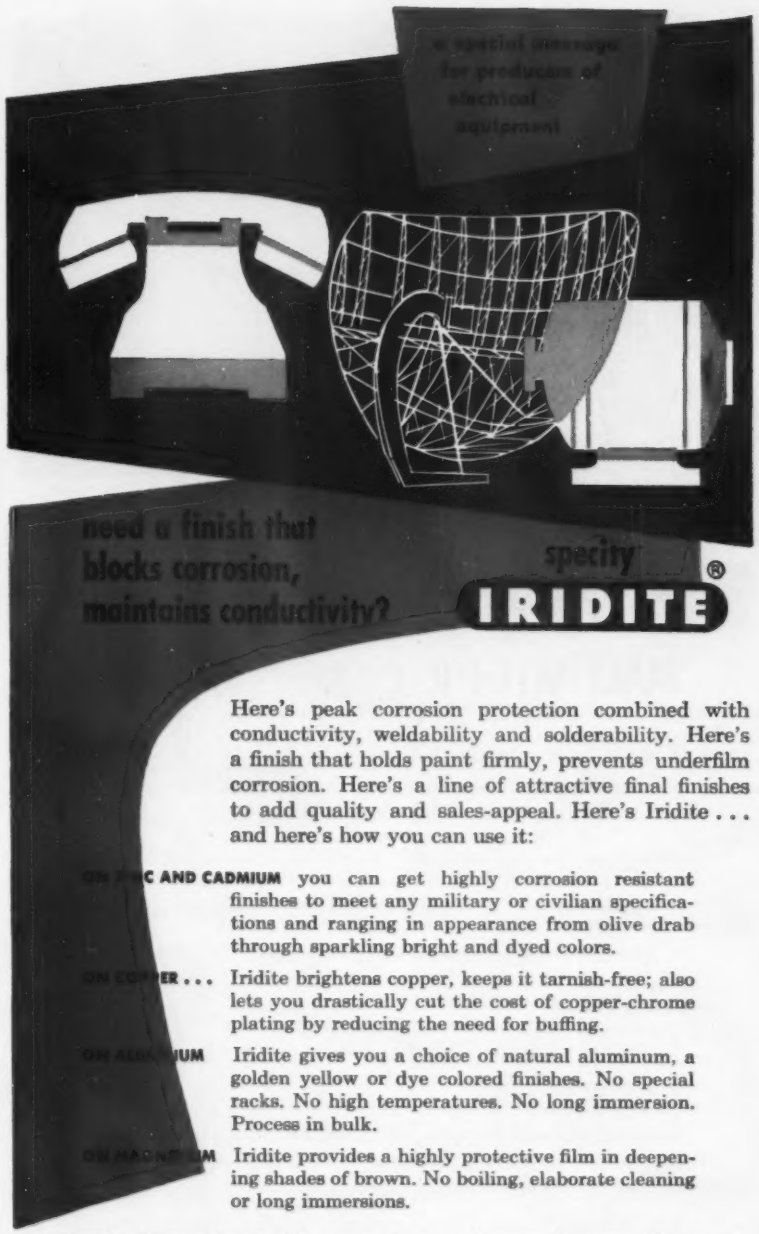
The aluminum alloy utilized for the new hollow machining stock is 6066, a wrought alloy developed by Harvey Aluminum, a division of Harvey Machine Co., Inc. General characteristics of 6066 are mentioned as excellent machinability, superior corrosion resistance, high strength, and excellent finish.

Lighter, Less Chip

For most machining applications, Harvey states, weight of the hollow aluminum stock averages less than half of the weight of a comparable size in solid bar, resulting in lower handling costs. Better chip control is another advantage of the new material; with little metal to hog out, there is a marked reduction in the amount of chip pulling, handling, and processing.

Because no time is required to rough out a cavity, the new hollow bar stock reportedly increases the speed of machining operations. Closer tolerances can also be held because the normal heat and pressures generated in machining solid bar stock do not occur.

Additional advantages mentioned as offered by hollow aluminum machining stock in comparison to con-



Here's peak corrosion protection combined with conductivity, weldability and solderability. Here's a finish that holds paint firmly, prevents underfilm corrosion. Here's a line of attractive final finishes to add quality and sales-appeal. Here's Iridite . . . and here's how you can use it:

ON ZINC AND CADMIUM you can get highly corrosion resistant finishes to meet any military or civilian specifications and ranging in appearance from olive drab through sparkling bright and dyed colors.

ON COPPER . . . Iridite brightens copper, keeps it tarnish-free; also lets you drastically cut the cost of copper-chrome plating by reducing the need for buffing.

ON ALUMINUM Iridite gives you a choice of natural aluminum, a golden yellow or dye colored finishes. No special racks. No high temperatures. No long immersion. Process in bulk.

ON MAGNESIUM Iridite provides a highly protective film in deepening shades of brown. No boiling, elaborate cleaning or long immersions.

AND IRIDITE IS EASY TO APPLY. Goes on at room temperature by dip, brush or spray. No electrolysis. No special equipment. No exhausts. No specially trained operators. Single dip for basic coatings. Double dip for dye colors. The protective Iridite coating is not a superimposed film, cannot flake, chip or peel.

WANT TO KNOW MORE? We'll gladly treat samples or send you complete data. Write direct or call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

Iridite is approved under government specifications

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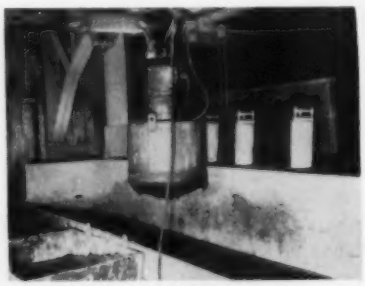
ventional solid screw machine stock are higher strength (typical yield 52,000 psi), superior corrosion resistance, greater stability, the utilization of less tooling, and a better surface for anodizing.

Readily machined, the new hollow aluminum stock can be obtained without tooling charges in standard round bar in a range of sizes. Diameters of rounds run from 1 in. through 2½ in. in 1/16 in. increments and 2⅝ in. through 3½ in. in ⅛ in. increments. Wall thicknesses for rounds vary from 0.109 to 0.500 in.

Cleaning:

Cut descaling time by 93 pct with magnet.

An all-welded lifting magnet is used in the pierce and Draw Dept. of The Babcock & Wilcox Co., Barberton, O., to speed cleaning of a 5 ft x 28 ft pipe descaling



Reduction in cleaning time through lifting magnet use.

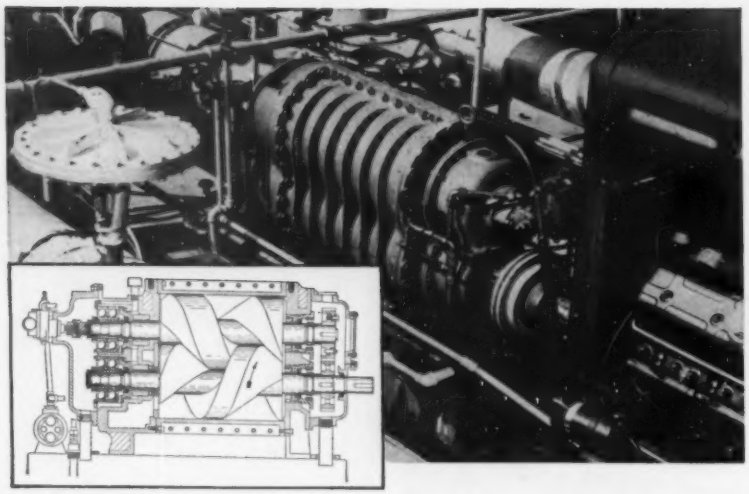
tank. The job now requires only four manhours, contrasted with the previous best time of 64 manhours for manual cleaning of the tank.

A product of The Electric Controller & Mfg. Co., Division of Square D Co., Cleveland, the lifting magnet is encased in a special jacket to protect its power leads from the hot caustic solution.

Lubrication:

Nylon tubing success in carrying lubricants.

A new, flexible nylon tubing of high burst rating is reported as



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BUILT WITH R-C *plur-ability*

Users of these latest Roots-Connersville Spiraxial Compressors tell us of their amazing efficiency and economy, at ranges of 700 cfm to 5,000 cfm, and pressures from 15 psi to 30 psi (or higher).

Then, there are these other R-C *plur-ability* advantages:

- No internal lubrication, hence oil-free air
- Direct-connected for speeds of 1750 rpm and 3550 rpm
- No water jacketing needed
- Compact—requires less space
- Minimum noise level

With many applications possible because of these advantages, we suggest you study the performance curves and other details in Bulletin SC-354. You may well find that the long-time economy of R-C Spiraxial units will justify replacing less efficient equipment.

Ask about *plur-ability* in all R-C equipment

Centrifugal and Rotary Positive Blowers, Gas Pumps and Exhausters
•
Positive Displacement Vacuum Pumps and Meters

Inert Gas Generators
•
Spiraxial® Compressors
•
Detailed bulletins available on all R-C equipment.

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.

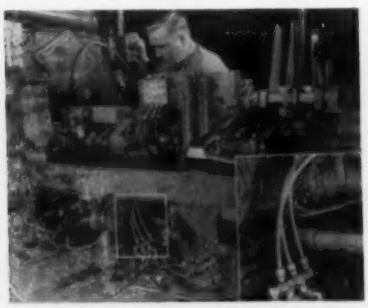
456 Ohio Ave., Connersville, Indiana. In Canada, 629 Adelaide St. W., Toronto, Ont.

solving maintenance problems on metalworking equipment in conveying lubricants, water and plastic spray as well as for air lines.

It was engineered for these purposes by the National Can Co., Chicago, to increase the efficiency of operating can body machines and automatic punch presses.

The following results were described as achieved: increased tubing life under concentrated flexing—so far by 25 times; elimination of machine down-time for tubing replacement and reduction of maintenance time; and use of smaller tubing and simplification of fitting and connector problems.

The processed nylon tubing, supplied by The Polymer Corp. of Pennsylvania, Reading, Pa., has ¼ in. OD with a 0.050 in. wall and a burst rating of 2500 psi.



Tubing lasts in continuous service of 12 months.

Continuous Lubrication

One machine, called the 'Body-Maker,' is a high speed unit which turns out 400 can bodies per minute. Its wing rocker arm, finger bar drive carriage, wing operation slide and clamp release lever all actuate at this rate of speed and require continuous lubrication to prevent wear. The automatic lubricating system developed to keep the machine in continuous operation required a tubing which could withstand these 400 flexes per minute.

A flexible tubing being essential, rubber was initially chosen. The system functioned well, but the rubber tubing snapped from flex and pressure fatigue. The nylon tubing, called Nylaflow,

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One operation usually removes paint, rust and oil at the same time.

One tank of Oakite Rustripper frequently does all these jobs: (1) strip rejects and conveyor hooks; (2) pickle rusted stock; (3) prepare reconditioned products for refinishing operations.

One tank may eliminate many tanks used in ordinary cycles.

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"Tube replacement required (only) 20 minutes..."

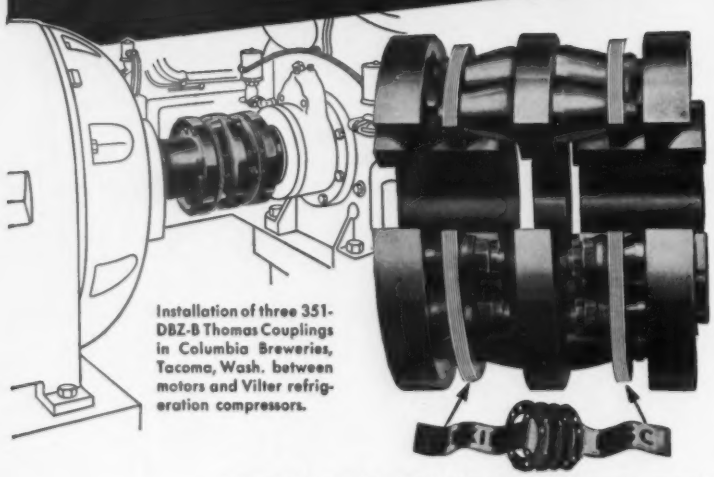
was selected for trial and has reportedly been in continuous service for 12 months (over 100,000,000 flexes) without a single replacement.

In addition, each tube replacement required 20 minutes downtime, with a corresponding increase in machine efficiency and decrease in maintenance charges.

This nylon tubing has proved equally successful for the plant's six automatic punch presses. Three 12 in. long segments of the ¼ in. OD tubing are used on each press. Two supply automatic lubrication from a high pressure system, and one supplies air.

It is described as completely unaffected by alkalis and practically all solvents. It is impervious to oil, gasoline, greases and hydraulic fluids and can serve as a medium to carry all of these materials. Although it retains its shape and much of its strength as high as 475°F, it is best suited for long term use below 180°F.

THOMAS FLEXIBLE COUPLINGS...
for more years of better service!

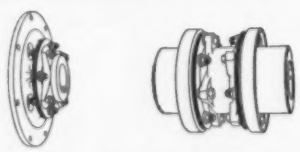


Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

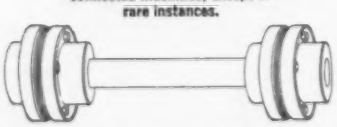
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

Forming:

Flat finishing equipment developed for drawing

A new machine especially designed to meet high production requirements for both shallow and deep draw operations in flat finishing has been developed by Cincinnati Cleaning and Finishing Machinery Co., Sharonville, Ohio. Cited as an example of new flat finishing equipment is a unit recently installed in the plant of an automotive parts manufacturer. The customer's problem was the deep drawing of bumpers from stock ranging from 0.075 in. to approximately 0.125 in.

Not only were the draws deep, Cincinnati states, but they also presented very severe radii. For that reason, a phosphatizing operation was included.

Procedure Described

In this specific case, the object was to reduce reject bumpers to a minimum. The following method was employed: first, a short wash and rinse preceding the phosphate section, followed by another short rinse, then by a pre-heat oven. This raises the temperature of the metal sheets to the correct degree for applying the soap coating which follows.

In the soap coater, a film of soap is applied to both top and bottom of the sheet. It then passes through a heated high pressure blow-off to insure that the metal sheets are thoroughly dry before going to the stacker.

The soap coater has two steam-actuated spray guns above and two below the conveyor. Controlled temperatures and proper positioning of these guns achieve a uniform coat of proper thick-

ness, such thickness being variable.

Subjected To Air Pressure

After soap-coating, the work is subjected to heated high pressure air, which removes any moisture, leaving only a dry film. The sheets can then be processed immediately, or stored for a period of time if preferred.

Length of this particular machine is 78 ft with a conveyor speed of 52 fpm. A disk conveyor is used to carry work through, disks being staggered from shaft to shaft. This accomplishes two purposes: it keeps work tracking straight through the machine, and insures complete exposure of the metal sheets to the nozzles.

Materials:

Better metallic paste pigments described.

A new line of multiple paste pigments, metallic and non-metallic, are described by the manufacturer, Chemical Sealers, Inc., Belleville, Ill., as offering a number of distinct advantages.

They were patented recently following a seven year investigation. Marketing is under the name CPC, the registered tradename for paste pigments manufactured and sold exclusively by Chemical Sealers, Inc., under patent.

CPC pigments are described as non-hygroscopic, non-oxidizing, non-corrosive, non-hydrolizing in the presence of water, acids or alkalies and non-discoloring. They are non-volatile.

Paints, varnish, enamels and inks manufactured with CPC pigments are mentioned as producing finished products which possess durability, luster and permanence. The wetting agent incorporated in CPC pigments is a halogenated, mobile, oily-like viscous liquid which remains permanently plastic.

CPC reportedly does not contain mineral spirits or oils. The wetting agent incorporated in CPC pigments lubricates, coats and polishes the metallic pigment flakes, producing a pigment paste possessing durability, permanence, brilliance, luster and gloss.

No Metallic Discolorization

These pigments are described as the first paste pigments of such metals as copper, bronze and even elemental iron, with practical applications. The new metallic pigments remain undiscolored and unoxidized indefinitely, even when exposed to moisture and to corrosive atmosphere with concentrations of acids and alkalies.

Among the other metallic pigments being developed by Chemical Sealers, Inc., are aluminum, either polished or unpolished; silver, gold, lead, antimony, nickel, titanium, stainless steel, beryllium, tin, chromium, vanadium and tungsten. A number of other metallic pigments may be used as well as mixtures of such pigments.

"Doc! It's like fighting DERMATITIS with an armored glove."

Except WEST *protective gloves* are invisible.

— quickly applied
— comfortable to wear
— easily washed away.

For skin exposed to oils, dust, grease and grime:
— use PROTECTIVE CREAM #211.

For skin exposed to acids, alkalies and inorganic chemicals:
— use PROTECTIVE CREAM #311.

For skin exposed to organic solvents, acetates and cutting oils:
— use PROTECTIVE CREAM #411.

WEST PROTECTIVE CREAMS protect against hundreds of troublesome industrial irritants.

Too, they're antiseptic. Inhibit harmful bacteria with Hexachlorophene. And most important, they protect *for extended periods of time.*

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New Books:

"Industrial Storeskeeping Manual," by Benjamin Melnitsky was written to "put modern managerial techniques to work for greater profits, in the area of warehouses and storeskeeping for business and industry." With examples drawn from many American companies, the author covers all phases of this problem including cutting paperwork costs, materials handling, receiving, stowage and issuance, protection and inventory. The book is recommended for production men, storeskeepers, warehousemen, purchasing agents, comptrollers, accountants, materials handling experts and management personnel involved in the problem of cutting costs through greater efficiency. Chilton Co., Book Div., Chestnut and 56th Sts., Philadelphia 39. $6.00. 279 p.

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Power driven rolls or conveyor, cradles coil stock. Straightener unit provides individual adjustment on upper pinch and straightener rolls. Positive aligning wedge mechanism is employed to adjust rolls. Loop control arm regulates flow of stock. The Unit is sturdy and reliable.

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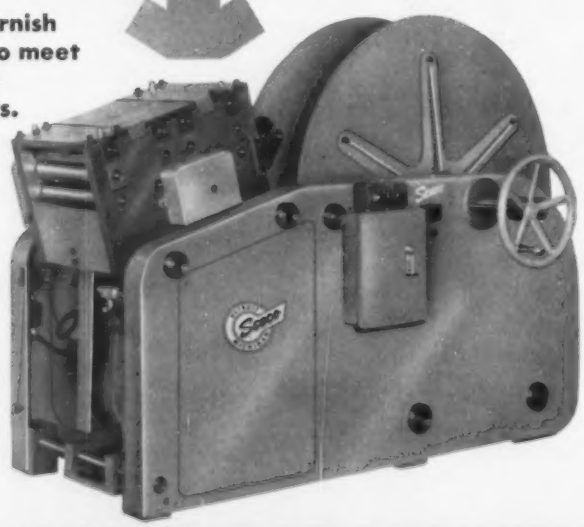

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engineers & manufacturers of machine tools and press room equipment

"The Lorco Method of Precision Barrel Finishing for Metals and Plastics" is a handbook telling how to tumble to get good results and production savings. Basic techniques, developed around a series of 27 chemical compounds, used with or without fused aluminum-oxide chips and other media, are described. Chapters cover general procedures for metal parts, ferrous and non-ferrous and one is devoted to a new technique of barrel finishing of plastic products. Lord Chemical Corp., Dept. Q, 2068 S. Queen St., York, Pa. 50 cents a copy. 44 p.

"Handbook of Fastening and Joining of Metal Parts," by Vallory H. Laughner and Augustus D. Hargan is described as "a compilation of data on standards, performance and methods (prepared) to aid in selection of the most suitable methods of assembling metal parts and products." Covering accepted practice in assembling or fastening metal parts, the book discusses such factors as the joining of dissimilar metals, the types of resins and adhesives that can be used to fasten metal both to metal and to other materials, and the advantages and disadvantages of different types of joints. Also considered in the book are screw thread and nuts, collars, couplings, keys, brazing, soldering and types of welding; information for welded strengths in various ferrous and non-ferrous alloys; and techniques for solving a number of special problems in fastening and joining. McGraw-Hill, 327 W. 41st St., New York 36, $15.00. 622 pages containing 262 illustrations.

ASME Handbook: Engineering Tables. Sponsored by the Metals Engineering Handbook Board of the American Society of Mechanical Engineers and edited by Jesse Huckert. This reference work, one of the four volumes of the ASME Handbook, was planned to give engineers and designers tables of recognized design standards. It is conveniently arranged in 15 sections, grouping together tables

which apply to the design of specific parts. Covered are such subjects as bar stock and shafting; bearings; spur, helical and herringbone, bevel, and worm gears; cylindrical fits; keys and keyseating; bolts; springs, aircraft and mechanical tubing; serrations and splines; electrical motors, and gaskets. McGraw-Hill, 327 W. 41st St., New York, 36. $12.00. 704 p.

"Engineering Manual for Control of In-Plant Environment in Foundries," prepared as a project by the American Foundrymen's Society Safety, Hygiene and Air Pollution Control program, contains general background information and specific design data for making foundries a better place to work. Consideration is given materials and processes that influence health, ventilation and comfort—such as ventilating systems and specifically, the specific design of exhaust hoods and exhaust systems. Particular problems of foundry operations are discussed and remedies given in chapters that cover sand handling, molding and core making, melting and pouring, radiation, cleaning room, welding, woodworking and dust and fume collectors. American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill. $6.00 for Society members and $7.75 for non-members. 152 p.

"English-German and German-English Dictionary for the Iron and Steel Industry," is a 330-page glossary containing 168 pages of English to German and 162 pages of German to English. The work, prepared by Eduard L. Köhler, assisted by Alois Legat, is published by Springer-Verlag, Vienna, Austria. $6.65.

"Successful Handling of Labor Grievances," by Bertram R. Crane and Roger M. Hoffman is a definitive analysis of the handling of grievances. It includes sections on what is and is not a grievance, classification and selection of grievances, their presentation, provisions and proper treatment in contracts, as well as the role of management and labor in approaching and working with grievances. Appendices include typical examples of industrial grievances, contract grievance procedures, and grievance forms. Central Book Co., 261 Broadway, New York 7. $5.95. 300 p.

"Steel Foundry Practice," by the late John Howe Hall is designed as a detailed discussion of the many practices followed in the production of steel castings. Topics covered include core and molding sands, patterns and molding methods, gates and heads, machine molding, flasks and rigging, centrifugal casting, shakeout, open-hearth steelmaking, electric melting furnaces, converter process and pouring practice. Penton Publishing Co., Penton Building, Cleveland 13. $12.00.

Here is a completely new electric-hydraulic forcing and straightening press, with construction and operating advantages never before offered in a low-cost shop press.

These are a few of the features:

- **Rapid Ram Approach** — Automatically changes to power stroke when it contacts the work.
- **Movable Workhead** — Self-contained—easy to center over the work. Workhead can be purchased separately.
- **Variable Ram Speed** — From zero to maximum under fingertip control.
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These and dozens of other features are fully described and illustrated in new Bulletin No. 347, which we will send promptly on request. Send the coupon today.

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MATERIALS: Announce Heat-Resistant Brick

No cracking or fracturing reported when broken door dumps burning coke, slag and molten iron on foundry floor and fire hoses give it shock of cold water . . . Described as speedy way to place heavy-duty floor.

Emeri-Brick described as a versatile new heat-resistant brick that withstands the effects of heat and thermal shock, is now being manufactured by Walter Maguire Co., Inc., New York, N. Y.

It is reported as providing a speedy means of placing a heavy-duty floor that can withstand high temperatures and severe thermal shock.

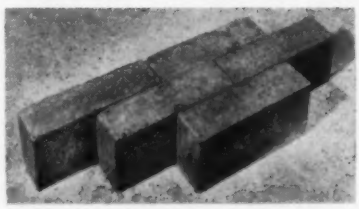
Another advantage of Emeri-Brick is stated as its long service life. In its first installation at the gray iron foundry of a large automobile manufacturer in Saginaw, Mich., it has outlasted the brick formerly used.

Evidence of its ability to withstand heat and sudden thermal shock was obtained dramatically when a bottom cupola door broke at the same manufacturer's foundry in Tonawanda, N. Y. When the 1500 lb door broke, it dropped, together with 5 to 6 tons of burning coke, slag and molten iron, onto the Emeri-Brick floor from a height of 7 ft. Fire fighters arrived in about 20 minutes, and turned streams of water from their hoses on the red hot mass for about 30 minutes before it was finally quenched. The next day, after debris had been removed, the floor was found to be undamaged. The impact of the heavy iron door and the shock of the cold water had caused no cracks or fractures.

The heat-resistant Emeri-Brick can be placed on end, on edge, or flat.

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 121. Just indicate the page on which it appears. Be sure to note exactly the information wanted.



Long service life is reported for this new brick.

don't overlook this diamond... it stands for

P&A
ESTABLISHED 1869

QUALITY
BRASS
BRONZE
NICKEL SILVER

Sheet, Strip, Mill Coils or Cut to Length

THE PLUME & ATWOOD MANUFACTURING COMPANY
Thomaston, Conn.

Metals:

New alloy incorporates high tensile strength.

Udimet 500, a new super alloy, is being produced in production quantities according to the Metals Division of Utica Drop Forge & Tool Corp., Utica, New York.

The alloy, which has been developed by the Utica concern, and vacuum melted in their 1000 lb furnaces, is described as showing remarkable elevated tensile strength and stress rupture life. Metallurgists at Utica say that because of its properties, Udimet 500 is currently being used as turbine

bucket forgings in advanced design jet engines.

It is reported that at 1600°F this alloy has an ultimate tensile strength of 100,000 psi and it will withstand a constant stress of 28,000 psi for over 100 hours. Other applications for the new alloy, besides turbine buckets, may include bolts and fasteners and sheet material for high temperature applications.

Rolled Into Barstock

Basically, Udimet 500 is a nickel-chromium cobalt alloy with 3 pct each of titanium and aluminum. To maintain accurate control composition this alloy must be melted under vacuum.

The 1000 lb vacuum furnaces at Utica have been producing as much as 60,000 lb of this material a month. After melting it is rolled into either barstock or strip.

Lubrication:

Stabilized molybdenum disulfide solves corrosion problems.

Lockrey Co. of Southampton, N. Y., manufacturers of Liqui-Moly (MoS_2) lubricants for extreme conditions, are recommending this new lubricant for use in many severe applications involving extremes of temperature, pressure, speed and exposure.

It is known, they state, that under certain conditions of exposure, MoS_2 reacts with moisture in the air to form acids which are corrosive to some bearing materials. While in the various Liqui-Moly compounds this condition is offset to a major extent by the suspension of the dry MoS_2 powder in various liquid vehicles, which serve to protect the powder from the atmosphere, acid-formation is still possible when the protective vehicle evaporates or oxidizes under high temperatures, leaving the MoS_2 exposed.

Chemical Buffer Used

To offset this possibility completely, Lockrey developed a process of coating the dry powder, before its formulation into "Liqui-

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Bright, Smooth No. 3 Finish takes Plating Beautifully—Adds Eye-Appeal to Your Products

Continental's new technique for producing #3 finish flat and special shaped wire offers you a range of standard and special wire shapes with a satin smooth finish for electroplating purposes. Previously, only flat wire with a surface suitable for high polish electroplating was obtainable...but now from Continental you can specify #3 finish in flat, square, rectangular, oval, and other shapes on inquiry, in practically any size, temper, and analysis in low carbon and medium low carbon steels. (Note—some sizes of above shapes require special tooling before they can be produced.) Here is extra "eye-appeal" for moldings, product trim, or wherever a formed plated wire component is required. Send us a blueprint of your part, or mail the coupon today.

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Manufacturer's wire in many sizes, shapes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

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Compact POWER

To Move MORE, *FASTER*... *It's* WISCONSIN-POWERED

Wisconsin Engine power *on the go!* The Wisconsin-powered Truck-Man Model DR Truck-Tor Tractor, above, with 500 ft. lb. draw bar pull, is built by The Knickerbocker Company, Jackson, Michigan.

Wherever you put power to work in the 3 to 36 hp range, Wisconsin Heavy-Duty Air-Cooled Engines offer rugged, steady-going dependability. Every Wisconsin has tapered roller bearings at *both* ends of the crankshaft . . . eliminating "bell mouthing" by taking up radial- and end-thrusts. Such features as fool-proof *air-cooling* from sub-zero to 140° F., and an easily-serviced OUTSIDE magneto with impulse coupling for fast starts also add up to the kind of performance you *expect . . . and get.*

Write for Bulletin S-188 with "Specs" covering the full line of Wisconsin Air-Cooled Engines—4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

A 8748-1½

Moly," with a chemical buffer which prevents the formation of free acid under any conditions. This new buffer not only prevents the formation of free acid, but also protects the oil in which the MoS_2 is suspended from oxidation or acidity in use.

Corrosion on plate (left), compared with similar, corrosion-free plate exposed to stabilized MoS_2.

The new stabilized "Liqui-Moly" therefore reportedly solves both the corrosion and the friction problems of lubrication. It combats acid corrosion by neutralizing the acids as they are formed, and reducing friction by the use of MoS_2, which is described as having the lowest coefficient of friction of any commercial lubricating material, in addition to its other well-known lubricating and protective qualities.

Materials:

Heat-resistant ceramic supplied in rope form.

Fiberfrax ceramic fiber, an aluminum-silicate material described as taking heat as high as 2300°F, is now available in rope form, according to The Carborundum Company, Niagara Falls, N. Y.

They report that 30 feet of Fiberfrax rope ½ in. in diam weighs a pound, giving 50 pct more rope length. Its resiliency, a result of the rope's long staple, is mentioned as making it especially useful as expansion joint packing and for high temperature caulking. The rope may also be used as insulator wrapping and for various high temperature gaskets and seals.

Fiberfrax rope, like paper, bulk

and block forms of Fiberfrax fiber is chemically inert and is unaffected by most furnace atmospheres including hydrogen. The rope is made in typical three-strand form, of which 15 pct consists of carrier-type fiber.

Rope successfully takes heat of blow torch and weight pull.

Fiberfrax rope will be produced ultimately in diameters ranging from ¼ in. to ¾ in. It is supplied in coils with a max. length of 800 ft.

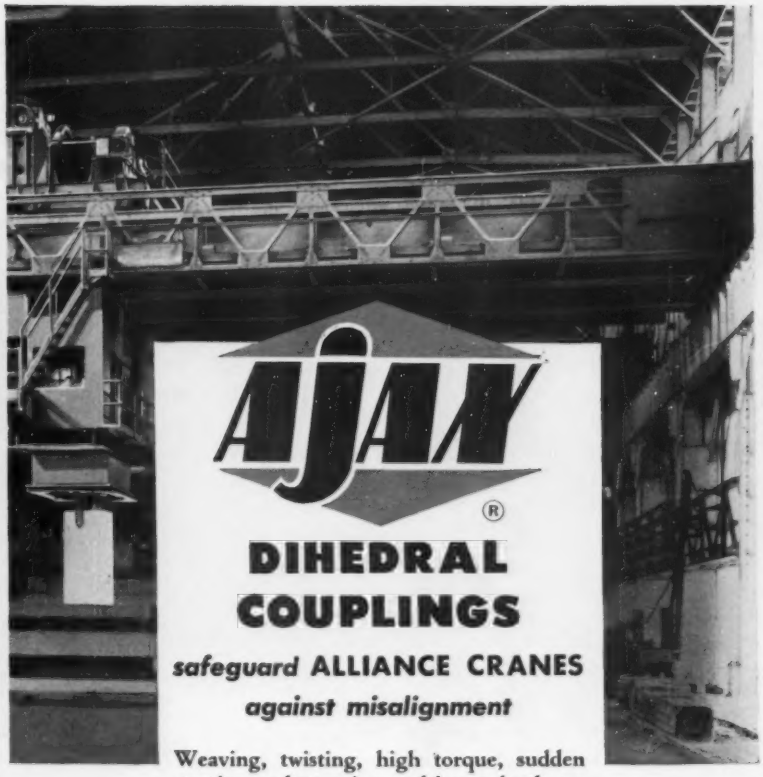
Cleaning:

New industrial solvent has less toxicity.

A new industrial solvent reported by the manufacturers to have cleaning properties closely resembling carbon tetrachloride, but up to 20 times less toxicity, has been introduced. The maker advises that the new solvent, named Vinsol, can be used with complete safety for virtually all applications, including those in confined areas. In addition, it is non-flammable, which eliminates danger of fire or explosion when used near open flames or next to grinding equipment.

Vinsol is recommended for removing oil, grease, wax and tars from hand tools, sheet metal, machine tools and components, tubing and other metal products. It is equally adaptable for cold cleaning, bucket cleaning and dip cleaning.

The product is manufactured by Speco, Inc., Cleveland.



AJAX®

DIHEDRAL COUPLINGS

safeguard ALLIANCE CRANES *against misalignment*

Weaving, twisting, high torque, sudden starting and stopping and heavy loads are being handled on many Alliance Cranes by Ajax Dihedral Couplings. Ajax Dihedral Couplings protect motor housings and bearings, winches, and running gear.

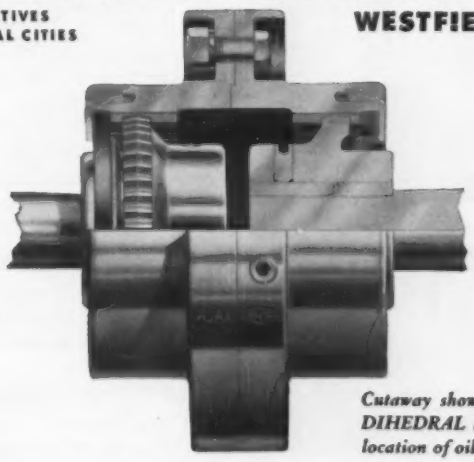
Ajax patented dihedral tooth design has less clearance than conventional gear type couplings. More tooth strength is provided under misalignment than is possible with any other tooth shape. Load is distributed at center of teeth at the point of greatest strength. Johns-Manville "Clipper" Seals keep lubricant in and foreign matter out.

Design engineers are invited to get the facts on Ajax Dihedral Couplings on this basis,— if you have alignment or misalignment troubles you can't afford to be without Ajax Dihedral Couplings! Tell us your troubles.

AJAX FLEXIBLE COUPLING CO. INC.

REPRESENTATIVES IN PRINCIPAL CITIES

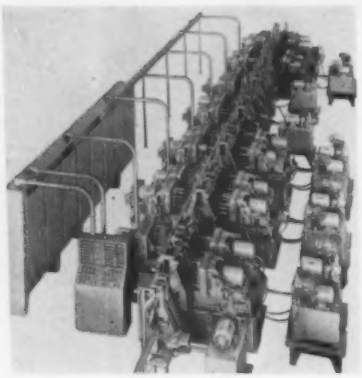
WESTFIELD, N. Y.



Cutaway shows Ajax patented DIHEDRAL tooth design and location of oil seals.

NEW EQUIPMENT

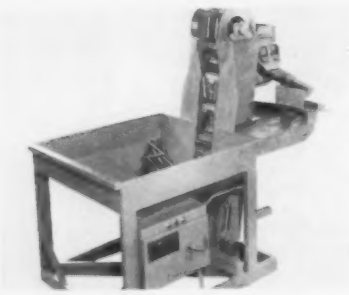
New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 121 or 122.



Transfer machine performs 155 jobs on torque plates

This 22-station, 70 ft long transfer machine performs 155 operations on two types of torque converter adapter plates. With each machining station equipped with automatic part-selector for unit control, the manufacturer states that no selection of the two different parts is necessary at the load station. The unit's operations include 37 drilling, 12 reaming, 4 boring, 37 countersinking, 36 inspection and 29 tapping. The 22 stations are—1 for loading, 14 for machining (including 2 for mechanical inspection), 6 for visual inspection and 1 for unloading. Special features include automatic lubrication of all moving parts; mist lubrication to all spindles; automatic depth inspection of all holes before tapping; spindles arranged for pre-setting of cutters; and bases sectionalized for easy processing. *Buhr Machine Tool Co.*

For more data circle No. 28 on postcard, p. 121



Hopper automatically orients and feeds heavy parts

This feed hopper is reported as automatically orienting and feeding bar shapes and parts from its storage bin to furnaces, presses, secondary operations, washing machines and other processes at production rates of 1000 pieces per hr. A controlled flow of oriented parts is described as automatically fed to the processing equipment without operator assistance. Size of parts handled may range up to 3 in. sq cross section with lengths to 16 in. Hopper capacity is 35 cu ft or 15,000 lb. The illustrated unit feeds 1¾ in. diam by 8 in. long heavy wall tubes to finish machining line at rate of 360 per hr. *Campbell Machines Co.*

For more data circle No. 29 on postcard, p. 121

Rectifier welder available in three models

For gas-shielded, consumable electrode welding, a new 800 ampere rectifier is available in three models to meet varying application requirements. It is described as featuring quiet operation, a combination cleaning-cooling fan, easily removable side covers, and silicone insulation. The number of welding voltages within the unit's rating are mentioned as suiting any condition of gas, and size and speed of wire. The basic unit is designed for hand adjustment of arc voltage by means of an adjustable autotransformer. The regulated constant potential model has all the features of the basic unit plus automatic adjustment for line voltage fluctuations. Other features of this model: voltage control, plug-in control circuit and control panel. *General Electric.*

For more data circle No. 30 on postcard, p. 121

Twin press bends large boiler drum shells

This press has a capacity of 5000 ton and stands over 25 ft high. It is described as capable of bending a steel plate up to 7½ in. thick and 36 ft long. In operation, four giant manipulator hooks powered by independent hydraulic circuits are used to place hot plates into position on the press. Each hook will lift 35 tons and is controlled by electric push buttons from either of two control consoles. *Babcock & Wilcox Co.*

For more data circle No. 31 on postcard, p. 121

Got a pain in the neck?

IF GRINDING PROBLEMS ARE GIVING YOU A PAIN IN THE NECK, SWITCH TO CINCINNATI (PD)° WHEELS. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that *can save you money . . . and increase your production.*

And we're definitely not sticking out our neck when we make these claims, because through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.* So, we think you'll agree it's worth investigating CINCINNATI (PD) WHEELS right away.

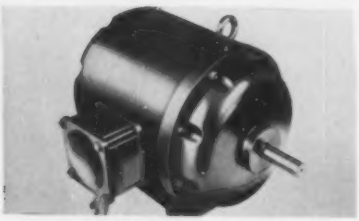
Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION.
°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

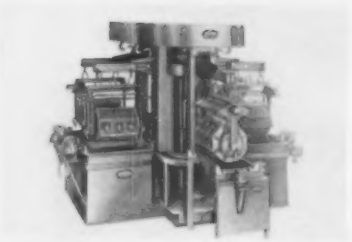
CINCINNATI° *Grinding Wheels*



Explosion-proof motors for hazardous locations

Designed to meet underwriters requirements for the three most common hazardous locations: gaseous, explosive dust and explosive grain dust, a line of explosion-proof motors are offered through NEMA frames 405 and 215. The motors are specially treated to resist moisture, dust and corrosive atmospheres and feature long flame paths at shaft and pre-lubricated ball bearings. *Sterling Electric Motors, Inc.*

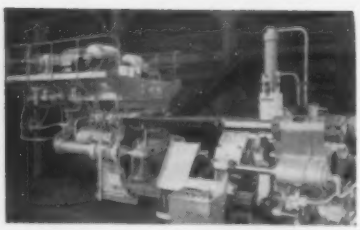
For more data circle No. 32 on postcard, p. 121



Automated barrel finishing systems announced

Two types of automated barrel finishing systems are announced as in use for micro-precision finishing of stamped, die cast, machined, extruded and centerless ground parts. Systems are controlled with preset switches. Operations performed include: descaling, degreasing, grinding, deburring, burnishing, rinsing and rust inhibiting. The systems are a skip-station type for parts requiring different finishes and an in-line type for parts requiring the same finishes. *Almco Div. of Queen Stove Works, Inc.*

For more data circle No. 33 on postcard, p. 121



New 2300-ton aluminuum extrusion press installed

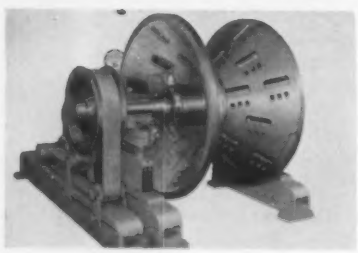
Installation is announced of the first of a series of 2300-ton self-contained hydraulic aluminum extrusion presses. Capable of extruding billets from 6 in. to 9 in. diam and up to 30 in. in length, as well as rectangular billets at speeds up to 48 in./min, this machine is described as handling 85 pct of all extrusion jobs. Approach speeds of 825 and 760 in./min respectively are given for the unit. *Lake Erie Eng. Corp.*

For more data circle No. 34 on postcard, p. 121

Electronic unit measures, stamps diameter on pistons

An electronic gage that measures taper and outside diameter on automobile pistons, then stamps a code letter on the piston to identify the diameter has been introduced. The unit takes measurements (i.e. taper between the top and the bottom of the piston skirt and the OD at the upper end of the skirt) simultaneously. If the taper measurement is not within tolerance limits, an electronic classifier will ignore the measurement and the part is rejected. Diameter classifications for acceptable units are available in six groups differing by 0.0003 in. plus oversize and undersize. An ink impregnated stamper unit stamps the code letter indicating the diameter on the piston itself. *Federal Products Corp.*

For more data circle No. 35 on postcard, p. 121



Balancing machine features operating flexibility

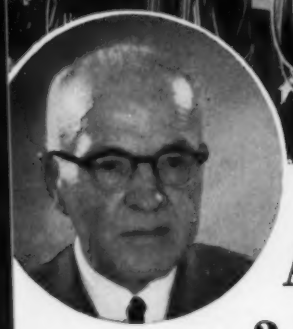
Pedestal type design is said to permit a new balancing machine's units to be placed together or separated according to the length of the piece to be balanced. This, the maker states, gives the unit adaptability for use on the shortest rotors or the longest type of paper mill roll. Drive unit may be positioned at either end or in the center. When not in use, the units may be pushed together in minimum floor space. *Raydyne Corp.*

For more data circle No. 36 on postcard, p. 121

Sectional impregnated abrasive buff announced

A new sectional impregnated abrasive buff for the buffing of all ferrous and nonferrous metals has been developed. They are engineered of specially-treated biased cloth and impregnated with selected abrasive grains bonded throughout their construction. The buffs are recommended, in the finer grit sizes, for normal cut-down operations to prepare surfaces for color buffing or plating or both. The buffs can be altered by spacers to adjust cutting and provide greater coverage. *Carborundum Co.*

For more data circle No. 37 on postcard, p. 121



A plant manager asks 3 leading questions about V-belts

1 "I stock 85 different sized sets of belts—how can Veelos help me?"

With *four* 100′ reels of Veelos (O, A, B, C widths) you can replace as many as 316 different sizes of endless belts —and store your Veelos in *inches of space!* Veelos cuts your inventory to a minimum. No obsolescence or deterioration, no worries about specific sizes. With Veelos, your storage and inventory problems are licked!

2 "How does Veelos cut installation and down-time?"

Veelos is an *adjustable belt.* With Veelos, there's no tearing down outboard bearings, no resetting, tilting or moving motors to make belt replacement or repairs! And you don't have to replace a complete matched set because of one loose belt—Veelos belts adjust to any length, can be altered by adding or removing links!

3 "How do I eliminate costly belt vibration?"

Install Veelos in place of ordinary belts! Veelos belts are absolutely uniform; every stud and link is identical; every foot of the reel is identical and uniform; they're perfectly balanced. Your Veelos salesman can easily prove to you with a Veelos Vibration Analyzer (tested against any V-belt you might now be using) that Veelos *cuts vibration up to 90%!*

VEELOS
THE BALANCED
LINK-V-BELT

Veelos is known as Veelink outside U.S.A.

Get your free Veelos Data Book; many pages of important information on belt drives. Write to:

MANHEIM
Manufacturing & Belting Company
108 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists Since 1911"

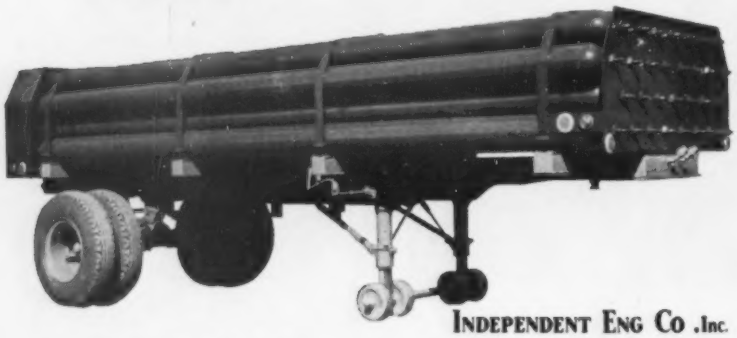
© M.M.&B. Co. 1956

Adjustable to any length • Adaptable to any drive • Balanced power • Constant power • Vibrationless power

REDUCE CYLINDER HANDLING up to 50%

with INDEPENDENT *Gas Supply TRAILERS*

TRANSPORTING — Argon — Carbon Dioxide — Helium — Nitrogen — Oxygen — Boron Trifluroide — Hydrogen — Ethylene. Trailer capacities from 187,000 cu. in. to 750,000 cu. in. water capacity. Trailer tubes ICC3A-2400 Specifications with 2400 PSIG Working Pressure.



Sizes and weights to meet all State requirements.

Can be mounted on bases for permanent storage.

INDEPENDENT ENG CO .Inc.

CONSULTING · RESEARCH · DESIGNING

O'FALLON 4, ILLINOIS

STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

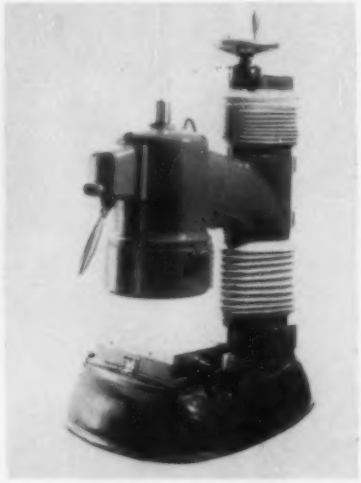
THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for less than $40 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. "SELECTING THE PROPER DIE HEAD FOR THE JOB" sent free on request.

THE EASTERN MACHINE SCREW CORPORATION 21-41 Barclay St., New Haven, Conn.

Surface grinder

An imported double column surface grinding machine has an interchangeable 8-in. grinding wheel for producing varying degrees of rough and fine work. The double column is described as ensuring greater grinding accuracy and eliminating wear during vertical



movement of the grinding arm. A hand wheel mounted atop the inner column raises or lowers the grinding area and a micrometer scale under the hand wheel provides accurate readings to 0.008 in. vertical feed. *Netherlands Trade Commission.*

For more data circle No. 38 on postcard, p. 121

Potentiometric recorder

When used with a tachometer-generator connected to a conveyor belt

drive, a potentiometric round-chart recorder permits direct reading and

recording of time in process for continuous ovens, furnaces, kilns and lehrs. The tachometer-generator furnishes a signal proportional to the conveyor speed. The reciprocal of speed (time) is the quantity to be recorded, so the tachometer-generator's speed signal must be converted. This is accomplished by a slide wire coupled to the self-balancing potentiometric recorder, which records process time directly in minutes. *General Electric Co.*

For more data circle No. 39 on postcard, p. 121

Precision drill heads

Marketed under the name Top-flite, a new line of precision drill heads are described as drilling, boring, tapping, or reaming up to 12 holes in one stroke in an area up to 18 in. in diam. They feature interchangeable cluster plates jig-bored to customer requirements, designed to simplify setups, reduce time, and insure correct work without rejects. Snap clips on the drive spindles permit quick interchangeability. *Johnson Drill Head Co.*

For more data circle No. 40 on postcard, p. 121

Crane boom

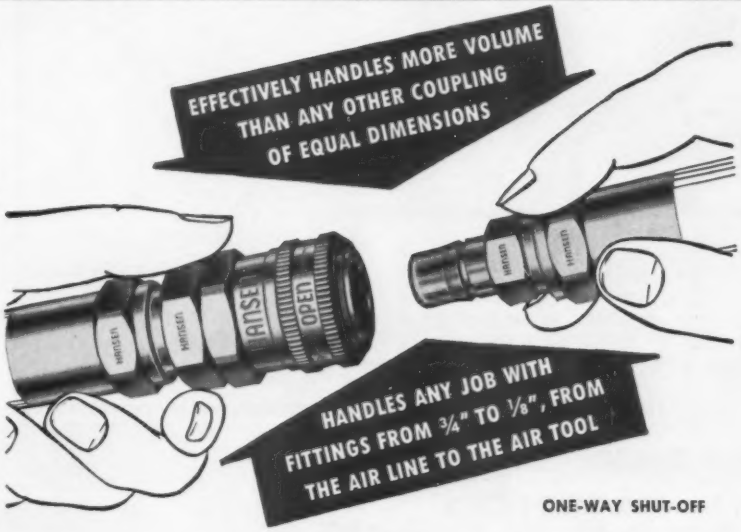
A new, all-welded crane boom featuring main chords of square tubes is now standard equipment on nine models of one firm's crawlers and rubber-tire cranes. The new design is described as weighing 20 to 30 pct less than booms with chords of conventional tubes for angle steel. *The Thew Shovel Co.*

For more data circle No. 41 on postcard, p. 121

Aluminum wound magnets offer increased power

For handling light scrap, such as sheet cuttings, cans or automobile bodies, a new series of light magnets are offered as standard equipment. The power of these magnets is reported as increased and the weight reduced. The circular electro magnet type 30-EDA, (shown in photograph) weighs 13,500 lb. *F. W. Shrader Co.*

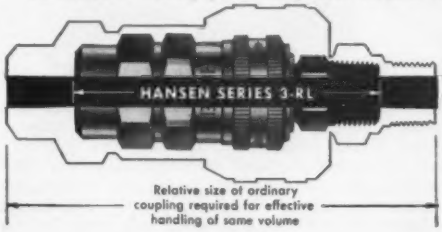
For more data circle No. 42 on postcard, p. 121


EFFECTIVELY HANDLES MORE VOLUME THAN ANY OTHER COUPLING OF EQUAL DIMENSIONS
HANDLES ANY JOB WITH FITTINGS FROM ¾" TO ⅛", FROM THE AIR LINE TO THE AIR TOOL
HANSEN
OPEN
ONE-WAY SHUT-OFF

HANSEN Series 3-RL
RING-LOCK COUPLING

Smaller—lighter—compactly designed, the Hansen Series 3-RL Coupling *effectively* handles far more volume than any coupling of equal dimensions. On any job requiring ¾" to ⅛" connections—from the air line to the air tool—this single size Hansen Ring-Lock Coupling—with completely interchangeable Sockets and Plugs—does it all—makes it easy to keep stock of parts in balance—holds inventories to a minimum.

To connect, merely push Plug into Socket. To disconnect just turn the sleeve. Locking ring provides positive lock and assures tight fit. Sockets with aluminum bodies are available for use with small hand-operated air tools.



Write for Descriptive Literature

SINCE 1915 — QUICK CONNECTIVE FLUID LINE COUPLINGS

THE HANSEN MANUFACTURING COMPANY

4031 WEST 150th STREET • CLEVELAND 11, OHIO

Dial indicators

A new series of dial indicators include gears, racks and pinions which are precision hardened.

This is designed to impart great durability to these parts and reduce repair need. The indicators are available in four sizes—from 1 11/16 in. to 3⅝ in. in diam as well as long range and wetproof models. *Federal Products Co.*

For more data circle No. 43 on postcard, p. 121

Threaded insert

Miniature-sized, self-locking threaded insert is designed for use in materials such as aluminum and magnesium alloys and plastics where a strong internal thread is required. The insert, known as the NAR 4-40L, is made of nonmagnetic stainless steel. It is described as ideal for applications involving temperatures up to 550°F. It consists of two parts, which are easily installed in a drilled and tapped hole with an ordinary screwdriver. Easy replacement is accomplished without drilling. *Newton Insert Co.*

For more data circle No. 44 on postcard, p. 121

Wire partitions

Line of standard open-mesh wire partitions and accessories is available in two types of construction. These are all mesh and mesh-with-steel base. Panels can be supplied as standard units 8 ft high and in widths of 4 or 5 ft. When required, standard top panels are available for increasing overall height to 9, 10, 11 or 12 ft. Accessories in the line include: hinged doors, sliding doors, dutch doors and service windows. *Wire and Iron Products, Inc.*

For more data circle No. 45 on postcard, p. 121

Tap drivers

Reported as accommodating a wide range of tap sizes and providing accurate torque adjustment to suit varied operating conditions are a

MOTORIZED
COIL LIFTER
SAVES
STORAGE SPACE...
HANDLES COILS FASTER ... SAFER

1 Lifter Handles Both Wide and Narrow Coils With Same Speed and Economy

This C-F Coil Lifter, under control of the Crane operator handles hundreds of coils a day in a large mill ... wide, narrow, and of varying tonnage. Fast, infinite adjustments of the motorized legs permit quick pick-up and set-down. Legs can be opened to any width and held ... no need to open to maximum width to handle narrow coil. Maximum of 12" required between coils of any width—saves storage room.

Positive tong grip on coil tightens as lift is made ... insures safe handling. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for Bulletin and complete information.

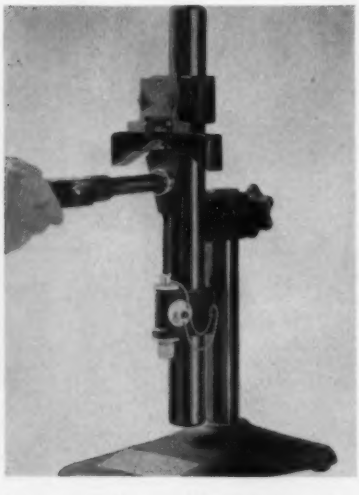
CULLEN-FRIESTEDT CO.
1303 South Kilbourn Avenue • Chicago 23, Illinois

new line of tap drivers. They are designed for use on any machine with a reversible spindle (except transfer machines, drilling heads and automatics with lead screws requiring special drivers with compensating springs). Adjustment of their torque is described as simple because they are marked with a normal and high torque setting for each tap size. *Scully-Jones & Co.*

For more data circle No. 46 on postcard, p. 121

Gage unit

An adjustable setting master for dial bore gages is set by means of gage blocks to any desired dimension between 1 in. and 12⅛ in. and then serves for the initial set-



ting or subsequent reference of a dial bore gage. Master can be successively reset to a number of different dimensions within its range. *Standard Gage Co., Inc.*

For more data circle No. 47 on postcard, p. 121

DC arcwelder

New dc arcwelder, called the Bumblebee, has selenium rectifiers especially for welding service which are designed to convert alternating current to direct current. It features a single range of current adjustment. Design is described as permitting stacking for parallel operations with weather-proof construction for outdoor operation. *Air Reduction Co., Inc.*

For more data circle No. 48 on postcard, p. 121

Perforations perplexing you?

If you have a design problem that's got you down maybe Hendrick can be of help. Sometimes the easiest and quickest way to enhance a product's beauty is to include a pleasing pattern of perforations in its design. Hendrick perforated metal not only helps increase a product's overall attractiveness, but also adds to its saleability as well. And whatever material you're using . . . whether it's metal, masonite, rubber, plastic, hard or insulated board for decorative display or fabricating purposes you can draw on Hendrick's long experience and perforating facilities to fill the bill. Write for details.

...better call HENDRICK

Hendrick
MANUFACTURING COMPANY

37 DUNDAFF ST., CARBONDALE, PA. • *Sales Offices in Principal Cities*

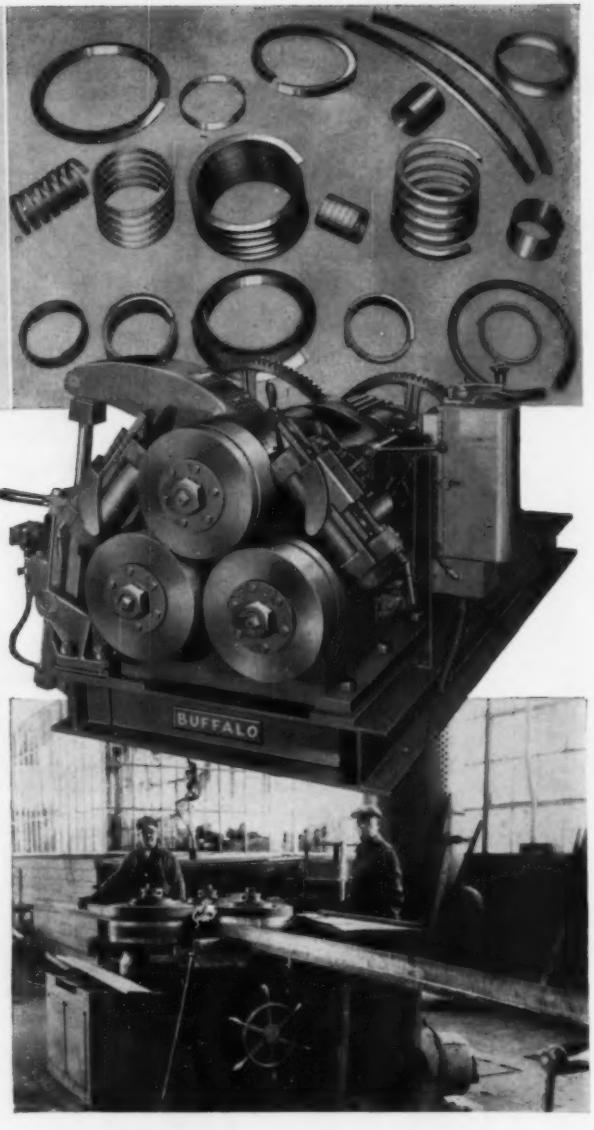
Perforated Metal • Perforated Metal Screens • Wedge-Slot and Wedge Wire
Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids

ARMSTRONG *Drop Forged*
LATHE DOGS

ARMSTRONG Lathe Dogs give extra service because they are drop forged from selected open hearth steel, and are heat treated to extreme toughness and stiffness. Hubs are made large enough to permit re-tapping, screws are also of special analysis steel and are hardened at the point to prevent upsetting. ARMSTRONG Dogs come in 10 types with square head or safety headless screws, with straight or bent tails. They are carried in stock by your local ARMSTRONG Distributor.

Write for Catalog

ARMSTRONG BROS. TOOL CO.
5209 West Armstrong Ave., Chicago 30, Ill.
New York and San Francisco



"BUFFALO" BENDING ROLLS DO JOBS LIKE THESE IN MINUTES!

Pictured here are just a few of the curved shapes you can cold-roll quickly, accurately and cheaply with "Buffalo" Bending Rolls. For example, rings can be mass-produced from standard structurals coiled by a Bending Roll. Many shops form ring gear blanks very economically this way. Rolls are easily changed for varying setups and different structural shapes. "Buffalo" Bending Rolls are available in sizes to handle everything from the heaviest work down to the smallest members bent in fabrication shops. Write for Bulletin 352 and see the "Q" Factor* features for convenience, durability and economy that go into these "Buffalo" machines.

NEW "BUFFALO" HYDRAULIC BENDING ROLL. Upper roll is quickly and effortlessly positioned or released hydraulically for important setup time savings. Write for details on this popular new feature!

** The "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.*

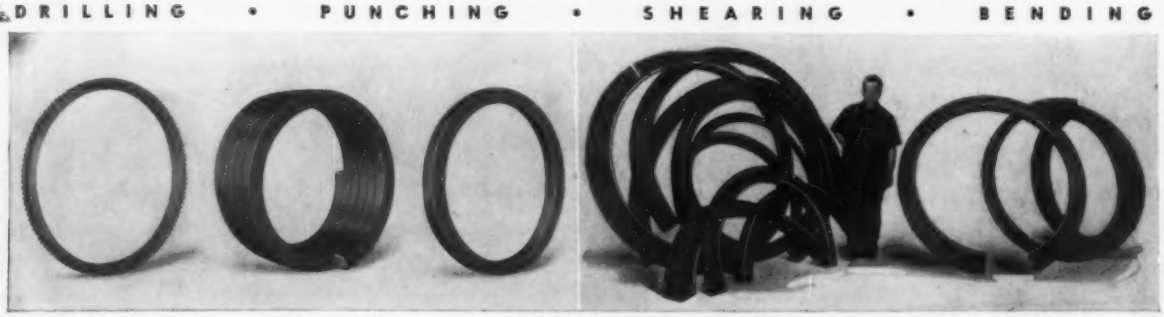
ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

BUFFALO FORGE COMPANY

492 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING • PUNCHING • SHEARING • BENDING



The Iron Age SUMMARY . . .

Tough three months facing steel consumers and producers . . . Steel labor is loaded for bear, will use steel financial reports as battering ram . . . Optimism grows.

Tough Times Ahead . . . Steel users and producers are facing one of the toughest three months in recent years. The chips are down in the steel market, and only the ones who kid easily are letting up on the pressure.

Steel labor is loaded for bear this year. The United Steel Workers are armed with prosperous steel financial reports they will mould into a battering ram to obtain the best possible contract.

Industry leaders are privately conceding the supplemental unemployment demand, will take the best defensive position they can on wages, premium pay, and other demands. They will have a tough fight holding the tab to the current pattern of 17-18¢ an hr package.

THE IRON AGE Annual Financial Analysis covering 93 pct of the industry shows steel earnings up 72 pct last year compared with 1954, a slow year for the industry. Sales and production were up 32 pct. Net income on sales rose from 6 pct in 1954 to 7.8 pct in 1955.

The Auto Story . . . Steel users are finding the market a tough nut to crack. Automotive companies are revising upward earlier estimates of steel requirements this year. What it boils down to now is that the auto people expect to consume only slightly less steel than they did in record-breaking 1955.

Further, some top steel producers are more optimistic, are inclined to agree with IRON AGE'S New Year estimate that steel production will range from 118 to 120 million tons this year. THE IRON AGE this week has raised its sights to a 120-122 million ton range.

Although some market pressure can be attributed to strike hedging, it's not the whole story. Some consumers are pressing as hard for spots on third quarter order books as they are for second quarter delivery.

Scrap Boils Over . . . While plates and structurals continue in desperately short supply, cold rolled sheets, bars, and alloy steel are well on their way to becoming extremely tight again. Rosier outlook in automotive plus attempts at inventory building are two factors affecting the latter products.

The scrap market is on the loose again. Prices this week moved up in most consuming centers. and THE IRON AGE scrap composite price rose to $53.67 per ton, equalling the all-time high established during the second week of January.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,449	2,449	2,449	2,317
Ingot Index				
(1947-1949=100)	152.5	152.5	152.5	144.0
Operating Rates				
Chicago	99.0	93.5	100.0	98.5
Pittsburgh	102.0	103.0*	102.0	97.0
Philadelphia	101.0	105.0*	104.5	96.0
Valley	98.0	92.0*	97.0	95.0
West	100.0	100.0*	96.0	94.5
Detroit	103.0	103.0	101.0	91.0
Buffalo	105.0	105.0	105.0	105.0
Cleveland	101.0	102.0*	106.0	109.5
Birmingham	93.0	93.0	96.0	90.5
S. Ohio River	90.0	85.5*	95.0	92.0
Wheeling	99.0	101.0	101.0	95.0
St. Louis	95.0	97.0	106.0	95.0
Northeast	90.0	90.0	89.0	97.5
Aggregate	99.5	99.5	99.5	96.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.179	5.179*	5.179*	4.797
Pig Iron (Gross Ton)	$60.29	$59.71	$59.09	$56.59
Scrap, No. 1 hvy (gross ton)	$53.67	$52.50	$47.83	$37.00
Nonferrous				
Aluminum ingot	25.90	25.90	24.40	23.20
Copper, electrolytic	46.00	46.00	46.00	36.00
Lead, St. Louis	15.80	15.80	15.80	14.80
Magnesium	33.25	33.25	33.25	29.25
Nickel, electrolytic	64.50	64.50	64.50	67.67
Tin, Straits, N. Y.	100.375	99.00	101.25	90.75
Zinc, E. St. Louis	13.50	13.50	13.50	11.50

Demand Shifts From Detroit

Slight edge is off urgency for steel from Detroit . . . But demand is still strong, with some strike hedging . . . Hot-rolled sheet, plates and structurals in shortest supply.

◆ STRONGEST PRESSURE for steel products has shifted from automotive to other markets. Strongest demand is no longer for cold-rolled sheet, strip and bars, but for products not specifically connected with the auto industry.

This doesn't mean that auto steel buyers are letting up on their orders, but some of the urgency has eased. Automakers are still taking all the steel they can get, but some of it is going into inventory building.

Inventory building amounts to strike hedging in some cases. How much is difficult to pinpoint, but it is a factor in demand, although probably not a major one.

Theory is that if an auto company can build up a 30-45 day inventory, or perhaps longer, it will be able to run out its 1956 model season even if the Steelworkers go out. If not, it is money in the bank because of price increases to come.

Tightest products now are plate, structurals, hot-rolled sheet. Conversion deals are reported currently for hot-rolled sheet and light plate—and from non-automotive sources.

Meanwhile, the government has ruled that defense orders placed with steelmakers and suppliers of steel items governed by the Defense Materials System must be identified by the symbol "FC."

The new requirement is intended to help steel producers identify defense orders and to obtain production materials necessary to fill these orders. It is also intended to insure that scarce materials obtained on a priority basis are used in meeting actual military and atomic energy contracts.

All orders for shipment after June 1 must carry the "FC" symbol and certification. Such orders already accepted must be validated not later than April 16.

PLATES AND STRUCTURALS . . . These products are universally tight in all markets and shortages are cutting into construction projects, fabricating, as well as the recognized situation in railroad cars. It is now estimated that railroad car builders are able to get little more than 50 pct of the plate necessary for the goal of 9000 cars per month. Pipelines, tank builders, and even shipyards need about 25 pct more plate and structurals than they are getting. A farm equipment builder placed a conversion order in **Chicago** for light plate, and gray market activity for plate is reported in **Toledo. Chicago** fabricators are refusing to bid for some contracts because their steel is already earmarked. Plate is gone for the year in **Chicago** and extended carryovers are expected in **Pittsburgh** and the **East.**

BARS . . . Any talk of softness in bars is premature. **Pittsburgh** opinion is that auto orders are slightly below last year's peak, but small decline of a few weeks ago has come to a halt. Moderate cutbacks in orders were less serious in bars than in flat-rolled. **Detroit** second quarter allotments are generally picked up. Open space is caused by best customers being able to hold off until April 15. Any slowness in the market in **Chicago** is relative and represented only in rate of incoming orders. Backlogs are still there.

SHEET AND STRIP . . . Second quarter bookings are solid in **Pittsburgh,** despite some concern with first moderate automotive cutbacks. Some strike hedging is possible, but because of age hardening, automotive buyers won't get too far ahead, although they would like to see some daylight in case a strike materializes. In **Detroit,** Ford in particular was trying to get additional June tonnage lined up.

WIRE . . . Some concern over a slow farm demand is now pretty much discounted. April was expected to be slow in **Chicago,** but an upturn is reported. Bookings in **Pittsburgh** are solid for the second quarter and probably will result in carryovers. Some merchant wire prices moved up.

WAREHOUSES . . . Spot reports of a reduced incoming order rate at smaller warehouses continue, but this situation can't be taken at face value. Most still admit that demand exceeds incoming tonnages and they could sell more steel if they had it. Some are concerned about being caught in the third quarter with a badly balanced inventory, particularly on hot-rolled sheet, bars and structurals. **Detroit** warehouses could use more sheet business.

PIG IRON . . . As of April 1, all of the major pig iron producers are on the price boost bandwagon. Increase is $1.50 per ton on all grades. However, **Birmingham** producers are thus far refraining from moving up. Whether or not they will is still uncertain. One of the major producers with a plant in **Birmingham** and one in the **Ohio Valley** followed the trend in the northern installation, but as yet have made no statement concerning its Dixie plant. New IRON AGE composite price is $60.29.

RAW MATERIALS . . . Coke prices were advancing this week following increases in coal prices. Connellsville furnace beehive moved up to a flat $14.50 per ton from a range of $14-14.50, and foundry beehive to $17-18 compared with the previous $16-16.50. U. S. steel advanced ferromanganese prices $2.15 per ton April 1, following the lead of Electromet.

Purchasing Agent's Checklist

OHIO VALLEY: New expansion of industry along river creates new markets and supply sources . . p. 59

STOCKPILE: Government goals just over half full . . . . . p. 63

FINANCIAL: Iron Age financial analysis of steel industry . . . . . p. 26

Comparison of Prices

(Effective April 3, 1956)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Apr. 3 1956	Mar. 27 1956	Mar. 8 1956	Apr. 5 1955
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.325¢	4.325¢	4.325¢	4.05¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.05
Cold-rolled strip	6.28	6.29	6.29	5.79
Plate	4.52	4.52	4.52	4.225
Plates, wrought iron	10.40	10.40	10.40	9.30
Stainl's C-R strip (No. 302)	44.50	44.50	44.50	42.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$9.05
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.75
Special coated mfg. ternes	7.85	7.85	7.85	7.85
Bars and Shapes: (per pound)				
Merchant bars	4.65¢	4.65¢	4.65¢	4.30¢
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Structural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38.25	38.25	35.50
Wrought iron bars	11.50	11.50	11.50	10.40
Wire: (per pound)				
Bright wire	6.60¢	6.60¢*	6.60¢*	5.75¢
Rails: (per 100 lb.)				
Heavy rails	$4.725	$4.725	$4.725	$4.45
Light rails	5.65	5.65	5.65	5.35
Semifinish Steel: (per net ton)				
Rerolling billets	$68.50	$68.50	$68.50	$64.00
Slabs, rerolling	68.50	68.50	68.50	64.00
Forging billets	84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	96.00	96.00	96.00	86.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.025¢	5.025¢	5.025¢	4.675¢
Skelp	4.225	4.225	4.225	3.90
Finished Steel Composite: (per pound)				
Base price	5.179¢	5.179¢*	5.179¢*	4.797¢

	Apr. 3 1956	Mar. 27 1956	Mar. 8 1956	Apr. 5 1955
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$65.26	$64.26	$63.69	$61.19
Foundry, Valley	60.50	60.50	59.00	56.50
Foundry, Southern Cin'ti	62.93	62.93	62.93	60.43
Foundry, Birmingham	55.00	55.00	55.00	52.88
Foundry, Chicago	60.50	59.00	59.00	56.50
Basic, del'd Philadelphia	64.48	63.73	62.77	60.27
Basic, Valley furnace	60.00	60.00	58.50	56.00
Malleable, Chicago	60.50	59.00	59.00	56.50
Malleable, Valley	60.50	60.50	59.00	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	9.50¢
‡ 74.76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig iron	$60.29	$59.71	$59.09	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$55.50	$53.50	$47.50	$38.50
No. 1 steel, Phila. area	53.00	53.00	49.50	37.00
No. 1 steel, Chicago	52.50	51.00	46.50	35.50
No. 1 bundles, Detroit	52.50	46.50	44.50	29.00
Low phos., Youngstown	59.50	59.50	53.50	37.50
No. 1 mach'y cast, Pittsburgh	58.50	57.50	55.50	43.50
No. 1 mach'y cast, Philadel'a.	55.50	55.50	54.50	44.50
No. 1 mach'y cast, Chicago	56.50	55.50	51.50	47.00
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$53.67	$52.50	$47.83	$37.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50	$14.25	$14.25	$14.38
Foundry coke, prompt	17.50	16.25	16.25	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	$46.00	$46.00	$46.00	$36.00
Copper, Lake, Conn.	46.00	46.00	46.00	36.00
Tin, Straits, New York	100.375†	99.00	101.25	90.75
Zinc, East St. Louis	13.50	13.50	13.50	11.50
Lead, St. Louis	15.80	15.80	15.80	14.80
Aluminum, virgin ingot	25.90	25.90	24.40	23.20
Nickel, electrolytic	64.50	64.50	64.50	67.67
Magnesium, ingot	33.25	33.25	33.25	29.25
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To Identify producers, see Key on P. 168→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	62.00	62.50	63.00	63.50	.....
Birdsboro, Pa. *B6*	62.00	62.50	63.00	63.50	.....
Birmingham *R3*	54.50	55.00*	.....	.....	.....
Birmingham *W9*	54.50	55.00*	59.00	.....	.....
Birmingham *U4*	54.50	55.00*	59.00	.....	.....
Buffalo *R3*	60.00	60.50	61.00	61.50	.....
Buffalo *H1*	60.00	60.50	61.00	.....	.....
Buffalo *W6*	60.00	60.50	61.00	61.50	.....
Chester *C17*	62.00	62.50	63.00	.....	.....
Chicago *I4*	60.00	60.50	60.50	61.00	.....
Cleveland *A5*	60.00	60.50	60.50	61.00	65.00†
Cleveland *R3*	60.00	60.50	60.50	61.00	.....
Duluth *I4*	60.00	60.50	60.50	61.00	.....
Erie *I4*	60.00	60.50	60.50	61.00	.....
Everett *M6*	.....	62.50	63.00	.....	.....
Fontana *K1*	66.00	66.50	.....	.....	.....
Geneva, Utah *C7*	60.00	60.50	.....	.....	.....
Granite City *G2*	61.90	62.40	62.90	.....	.....
Hubbard *Y1*	.....	.....	60.50	.....	.....
Lone Star *L3*	.....	55.00	.....	.....	.....
Midland *C11*	58.50	.....	.....	.....	.....
Minnequa *C6*	62.00	62.50	63.00	.....	.....
Monessen *P6*	58.50	.....	.....	.....	.....
Neville Is. *P4*	60.00	60.50	60.50	61.00	65.00†
N. Tonawanda *T1*	.....	60.50	61.00	61.50	.....
Pittsburgh *U1*	60.00	.....	60.50	61.00	.....
Sharpsville *S3*	60.00	60.50	60.50	61.00	.....
So. Chicago *R3*	60.00	.....	60.50	.....	.....
Steelton *B3*	62.00	62.50	63.00	63.50	68.00
Swedeland *A2*	62.00	62.50	63.00	63.50	.....
Toledo *I4*	60.00	60.50	60.50	61.00	.....
Troy, N. Y. *R3*	62.00	62.50	63.00	63.50	68.00
Youngstown *Y1*	.....	.....	60.50	61.00	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. * Add $1.00 for 0.31-0.69 pct phos. † Intermediate low phos. Silvery Iron Buffalo, *H1*, $68.75; Jackson, *J1, G1*, $67.50. Add $1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill.

Product	301	302	303	304	316	321	348	410	416	430
Ingots, rerolling	17.75	19.00	—	20.25	31.50	25.00	33.75	15.00	—	15.25
Slabs, billets, rerolling	22.25	24.75	26.75	26.00	40.25	32.00	43.00	19.50	—	19.75
Forg. discs, die blocks, rings	—	—	—	—	—	—	—	—	—	—
Billets, forging	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.00	26.00
Bars, wires, structurals	38.00	38.25	41.00	40.25	60.75	45.25	60.00	30.50	31.00	31.00
Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	32.25	32.25
Sheets	44.25	44.50	52.25	47.25	68.25	54.25	73.50	36.25	—	36.75
Strip, hot-rolled	32.00	34.50	—	37.25	58.25	44.25	50.75	—	—	—
Strip, cold-rolled	41.00	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* McKeesport, Pa., *U1;* Washington, Pa., *W2,* (2.25¢ lower on Type 430) *J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *J4;* Philadelphia, *D5.*

Strip: Midland, Pa., *C11;* Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R3;* Middletown, O., *A7;* Harrison, N. J., *D3;* Youngstown, *C5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (.25¢ per lb higher); *W1* (.25¢ per lb higher); New Bedford, Mass., *R6.*

Bar: Baltimore, *A7;* Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5;* Ft. Wayne, *I4;* Philadelphia, *D5;* Detroit, *R5.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11.*

Plates: Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Philadelphia, *D5.*

Forged discs, die blocks, rings: Pittsburgh, *C11;* Syracuse, *C11;* Ferndale, Mich., *A3;* Washington, Pa., *J2.*

Forgings billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5.*

Composite Reaches Record High

Gains in Midwest push Composite to $53.67 . . . Most markets show strength in new surge . . . Detroit auto lists show tone of market . . . Only South has market lethargy.

◆ SCRAP PRICES moved up again this week, carrying THE IRON AGE composite to $53.67, equal to the all-time high established the second week of January.

Advances in Pittsburgh and Chicago accounted for the Composite advance. Philadelphia held steady. Other districts where prices moved upward included Buffalo, and Detroit, where a whopping advance of $5 per ton was due in part, at least, to defensive measures by brokers to keep scrap in the district.

While not unexpected, the strength of the market is all the more significant in the face of all-out production from mill blast furnaces. In Pittsburgh, for instance, a leading mill has had its entire complement of blast furnaces operating at capacity during the last several weeks, an unusual situation.

It looks as though March will set an all-time high record for consumption of open market scrap. Edwin C. Barringer, executive vice president, Institute of Scrap Iron & Steel Inc., says users have consumed at least 3.4 million gross tons this month, compared with the previous peak of 3.2 million tons in March 1953.

Meanwhile, some cain-raising is going on in Congress over scrap exports. House Majority Leader John McCormack, D., Mass., says bluntly he doubts Eisenhower Administration assurances that no U. S. iron and steel scrap is going to Communist countries. And he complains about being given the run-around on his questions concerning scrap exports. He's asking Defense Dept. to tell the House whether it sees anything wrong militarily with transshipment of scrap from West Europe to Communist areas.

Pittsburgh . . . On the basis of a purchase by a mill on the fringe of the district, No. 1 heavy melting steel advanced $2 per ton to a top of $56. Prices paid to district dealers for delivery to this mill were equivalent to $56 in Pittsburgh. Another indication of the market's strength was the $64 f.o.b. price paid for industrial bundles from an area generator. A purchase jumped blast furnace grades $3 and $4 per ton.

Chicago . . . Scrap prices moved up again this week with scrap leaving the area by every transportation route, including water shipments to Canada. There's an undertone of hesitance among some dealers, a feeling that the present climb is too good to be true. But this hasn't affected the stiff prices brokers are forced to pay to fill tonnage orders.

Philadelphia . . . The market in Philadelphia was firm and very active. The increase registered last week by most grades seemed to bring more scrap to the market. No. 1 heavy melting and bundles sold well at current price with no indication of any impending increase. A major consumer bought No. 2 heavy melting at $46, indicating that this is a representative quotation for this grade.

New York . . . In what is probably a slightly delayed reaction to the strengthening of nearby markets last week, No. 1 heavy melting showed up very strong at $48. This is an increase of $2, and there are indications that the price might move up a little higher before too long.

Detroit . . . No. 1 grades advanced another $5 this week because of extremely strong bidding on the April auto lists. Indications are that the top has still not been reached. Another prime reason for the advance is that local brokers want to prevent any scrap from leaving the area.

Cleveland . . . Biggest excitement last week was in record breaking price on auto lists which went for $61.50 to $63 to a new Cleveland branch of a Detroit broker for shipment to western Pennsylvania for about $68 delivered. In Cleveland and the Valley, the market was generally quiet following the upsurge of a week ago. One Valley mill bought industrial low phos scrap at $62 and a foundry paid $64.50-$66 for industrial electric furnace bundles. Primary grades in dealer yards in Cleveland and Valley are still hard to find.

Birmingham . . . Consumer market for openhearth scrap is exceedingly quiet in this district in the face of skyrocketing prices in the North. The result is many southern dealers are shipping by rail, barge to consumers elsewhere. They say they can make a larger profit by this means than they could by selling at prices offered at home, even with added freight.

St. Louis . . . With the steel mills in need of scrap, and feeling competition from Chicago and other markets might draw the material away from them unless prices were increased, nearly every item on the list moved upward.

Cincinnati . . . Local price on primary grades went up $3 on announcement of monthly buying schedule by a major area consumer. Secondary grades went up from $1.50 to $2. Because of relatively low price on secondary grades and mill breakdown of a local consumer, heavy tonnage is expected to go to Pittsburgh by barge.

Buffalo . . . No. 1 and No. 2 heavy melting and No. 2 bundles moved up $1 on basis of purchases by the area's biggest mill. Machine shop turnings, shoveling turnings and cast iron borings are up $2 on the basis of prices being paid in Niagara Falls.

Boston . . . For the third straight week prices have advanced here for openhearth grades. The market is firm and active, but a shortage of freight cars is cutting into exports.

West Coast . . . Present price levels seem to be slowing up scrap flow. Mills have more than they need, but there's a noticeable increase in export activity after several months of a lull.

PICK UP MORE PROFITS IN SCRAP METAL

If your sorting and loading operations call for a fast-moving big-capacity crane, Bucyrus-Erie 15-B and 22-B Transit Cranes offer you many cost-cutting advantages. They have both big capacity for handling bulky, heavy loads, and top mobility for quick moves. Look over these important features—see what they can mean to you in lower handling costs.

TRANSIT CRANES ARE EASY TO HANDLE

Fully independent power boom hoist makes boom control fast and accurate . . . power-controlled lowering for main hoist line provides high accuracy in lifting or lowering loads. Booms are easy to spot because friction swing brake, in addition to regular swing lock, holds the boom exactly above any point. Direct-connected control levers deliver instantaneous exact responses.

TRANSIT CRANES ARE POWERFUL

The 15-B model is rated at 15 tons; the 22-B at 25 tons. High lifting capacity per pound of weight results from concentration of operating machinery behind center of rotation, for maximum counterweight effect. Power unit is especially tailored for exacting demands of crane work . . . gives steady and dependable performance on heavy and difficult lifts which impose rapid and constant fluctuations from peak loads to no loads.

TRANSIT CRANES OFFER EASY MOBILITY

These easy-moving, easy-steering units can serve your entire yard. Carrier mountings have ten speeds forward and two reverse. Top speed is 33 mph.

Detailed information and illustrated literature on Transit Cranes is available from your nearby Bucyrus-Erie distributor. See him soon. 130E55

BUCYRUS ERIE
South Milwaukee
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Years of Service
To Men
Who Shape The Earth

INVESTIGATE THE HYDROCRANE FOR SMALL-SIZE PICK-UPS

This all-hydraulic truck-mounted 4-ton crane moves through traffic at 50 mph to load small quantities of scrap quickly at distant pick-up points. These borderline jobs yield big profit returns for you through lower per-ton pick-up costs.

Scrap Prices *(Effective April 3, 1956)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$55.00 to $56.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 bundles	55.00 to 56.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	37.00 to 38.00
Mixed bor. and ms. turn.	37.00 to 38.00
Shoveling turnings	41.00 to 42.00
Cast iron borings	41.00 to 42.00
Low phos. punch'gs plate	61.00 to 62.00
Heavy turnings	47.00 to 48.00
No. 1 RR hvy. melting	61.00 to 62.00
Scrap rails, random lgth.	66.00 to 67.00
Rails 2 ft and under	71.00 to 72.00
RR. steel wheels	64.00 to 65.00
RR. spring steel	64.00 to 65.00
RR. couplers and knuckles	64.00 to 65.00
No. 1 machinery cast	58.00 to 59.00
Cupola cast	52.00 to 53.00
Heavy breakable cast	49.00 to 50.00

Chicago

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 factory bundles	55.00 to 56.00
No. 1 dealers' bundles	52.00 to 53.00
No. 2 dealers' bundles	41.00 to 42.00
Machine shop turn	31.00 to 32.00
Mixed bor. and turn	33.00 to 34.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. forge crops	61.00 to 62.00
Low phos. punch'gs plate	57.00 to 58.00
Low phos. 3 ft and under	56.00 to 57.00
No. 1 RR. hvy. melting	57.00 to 58.00
Scrap rails, random lgth	66.00 to 67.00
Rerolling rails	73.00 to 75.00
Rails 2 ft and under	71.00 to 72.00
Locomotive tires, cut	62.00 to 63.00
Cut bolsters & side frames	62.00 to 63.00
Angles and splice bars	68.00 to 69.00
RR. steel car axles	68.00 to 69.00
RR. couplers and knuckles	61.00 to 62.00
No. 1 machinery cast	56.00 to 57.00
Cupola cast	52.00 to 53.00
Heavy breakable cast	44.00 to 45.00
Cast iron brake shoes	43.00 to 44.00
Cast iron car wheels	50.00 to 51.00
Malleable	64.00 to 65.00
Stove plate	45.00 to 46.00
Steel car wheels	64.00 to 65.00

Philadelphia Area

No. 1 hvy. melting	$52.50 to $53.50
No. 2 hvy. melting	45.00 to 46.00
No. 1 bundles	52.50 to 53.50
No. 2 bundles	43.00 to 44.00
Machine shop turn	35.50 to 37.00
Mixed bor. short turn	36.00 to 37.00
Cast iron borings	38.0 to 39.00
Shoveling turnings	39.00 to 40.00
Clean cast chem. borings	42.00 to 44.00
Low phos. 5 ft and under	55.00 to 56.00
Low phos. 2 ft and under	57.00 to 58.00
Low phos. punch'gs	57.00 to 58.00
Elec. furnace bundles	55.00 to 56.00
Heavy turnings	48.50 to 49.50
RR. steel wheels	59.00 to 60.00
RR. spring steel	59.00 to 60.00
Rails 18 in. and under	66.00 to 67.00
Cupola cast	50.00 to 51.00
Heavy breakable cast	53.00 to 54.00
Cast iron car wheels	55.00 to 56.00
Malleable	67.50 to 68.50
Unstripped motor blocks	38.00 to 39.00
No. 1 machinery cast	55.00 to 56.00

Cleveland

No. 1 hvy. melting	$57.00 to $58.00
No. 2 hvy. melting	48.00 to 49.00
No. 1 bundles	57.00 to 58.00
No. 2 bundles	44.00 to 45.00
No. 1 busheling	57.00 to 58.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Cut struct'r'l & plates, 2 ft & under	62.00 to 63.00
Drop forge flashings	57.00 to 58.00
Low phos. punch'gs, plate	57.00 to 58.00
Foundry steel, 2 ft & under	60.00 to 61.00
No. 1 RR. heavy melting	57.00 to 58.00
Rails 2 ft and under	71.00 to 72.00
Rails 18 in. and under	72.00 to 73.00
Railroad grate bars	42.00 to 43.00
Steel axle turnings	36.00 to 37.00
Railroad cast	58.00 to 59.00
No. 1 machinery cast	57.00 to 58.00
Stove plate	53.00 to 54.00
Malleable	60.00 to 61.00

Youngstown

No. 1 hvy. melting	$58.00 to $59.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 bundles	58.00 to 59.00
No. 2 bundles	43.00 to 44.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	34.00 to 35.00
Low phos. plate	59.00 to 60.00

Buffalo

No. 1 hvy. melting	$51.00 to $52.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 busheling	51.00 to 52.00
No. 1 bundles	51.00 to 52.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	31.00 to 32.00
Cast iron borings	31.00 to 32.00
Low phos. plate	55.00 to 56.00
Scrap rails, random lgth	55.00 to 56.00
Rails 2 ft and under	65.00 to 66.00
RR. steel wheels	55.00 to 56.00
RR. spring steel	55.00 to 56.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast	52.00 to 53.00
No. 1 cupola cast	49.00 to 50.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles, openhearth	52.00 to 53.00
No. 2 bundles	40.00 to 41.00
New busheling	52.00 to 53.00
Drop forge flashings	51.50 to 52.50
Machine shop turn.	22.00 to 23.00
Mixed bor. and turn.	25.00 to 26.00
Shoveling turnings	25.00 to 26.00
Cast iron borings	25.00 to 26.00
Low phos. punch'gs, plate	52.00 to 53.00
No. 1 cupola cast	44.00 to 45.00
Heavy breakable cast	37.00 to 38.00
Stove plate	38.00 to 39.00
Automotive cast	48.00 to 49.00

St. Louis

No. 1 hvy. melting	$45.00 to $46.00
No. 2 hvy. melting	42.50 to 43.50
No. 1 bundles	47.00 to 48.00
No. 2 bundles	38.50 to 39.50
Machine shop turn.	29.50 to 30.50
Cast iron borings	31.50 to 32.50
Shoveling turnings	31.50 to 32.50
No. 1 RR. hvy. melting	55.00 to 56.00
Rails, random lengths	58.50 to 59.50
Rails 18 in. and under	65.00 to 66.00
Locomotive tires uncut	55.00 to 56.00
Angles and splice bars	58.00 to 59.00
Std. steel car axles	61.00 to 62.00
RR. specialties	58.00 to 59.00
Cupola cast	50.00 to 51.00
Heavy breakable cast	43.00 to 44.00
Cast iron brake shoes	42.00 to 43.00
Stove plate	42.00 to 43.00
Cast iron car wheels	57.00 to 58.00
Rerolling rails	73.00 to 74.00
Malleable	50.00 to 51.00
Unstripped motor blocks	43.00 to 44.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$45.00 to $46.00
No. 2 hvy. melting	35.00 to 36.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	33.00 to 34.00
No. 1 busheling	44.00 to 45.00
Elec. furnace, 3 ft & under	46.50 to 47.50
Machine shop turn.	26.50 to 27.50
Mixed bor. and short turn.	27.00 to 28.00
Shoveling turnings	29.50 to 30.00
Clean cast chem. borings	31.00 to 31.50
No. 1 machinery cast	44.50 to 45.50
Mixed cupola cast	40.00 to 41.00
Heavy breakable cast	42.50 to 43.00
Stove plate	38.00 to 39.00
Unstripped motor blocks	26.00 to 26.50

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$47.00 to $48.00
No. 2 hvy. melting	40.00 to 41.00
No. 2 bundles	33.00 to 34.00
Machine shop turn.	25.00 to 26.00
Mixed bor. and turn.	25.00 to 26.00
Shoveling turnings	28.00 to 29.00
Clean cast chem. borings	32.00 to 33.00
No. 1 machinery cast	47.00 to 48.00
Mixed yard cast	44.00 to 45.00
Charging box cast	44.00 to 45.00
Heavy breakable cast	44.00 to 45.00
Unstripped motor blocks	29.00 to 30.00

Birmingham

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	36.00 to 37.00
No. 2 bundles	29.00 to 30.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	26.00 to 27.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	21.00 to 22.00
Electric furnace bundles	42.00 to 43.00
Structural and plate, 2 ft	49.00 to 50.00
Structural and plate, 2 ft	50.00 to 51.00
No. 1 RR. hvy. melting	47.00 to 48.00
Scrap rails, random lgth.	60.00 to 61.00
Rails, 18 in. and under	62.00 to 63.00
Angles & splice bars	58.00 to 59.00
Rerolling rails	63.00 to 64.00
No. 1 cupola cast	47.50 to 48.50
Stove plate	46.00 to 47.00
Charging box cast	32.00 to 33.00
Cast iron car wheels	37.00 to 38.00
Unstripped motor blocks	37.00 to 38.00
Mashed tin cans	15.00 to 16.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$53.00 to $54.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	53.00 to 54.00
No. 2 bundles	39.50 to 40.50
Machine shop turn.	32.00 to 33.00
Mixed bor. and turn.	33.50 to 34.50
Shoveling turnings	35.50 to 36.50
Cast iron borings	33.50 to 34.50
Low phos. 18 in. & under	57.00 to 58.00
Rails, random lengths	61.00 to 62.00
Rails, 18 in. and under	69.00 to 70.00
No. 1 cupola cast	48.00 to 49.00
Hvy. breakable cast	45.00 to 46.00
Drop broken cast	57.00 to 58.00

San Francisco

No. 1 hvy. melting	$36.00
No. 2 hvy. melting	30.00
No. 1 bundles	35.00
No. 2 bundles	26.00
No. 3 bundles	20.00
Machine shop turn.	18.00
Cast iron borings	20.00
No. 1 RR. hvy. melting	45.00
No. 1 cupola cast	45.00

Los Angeles

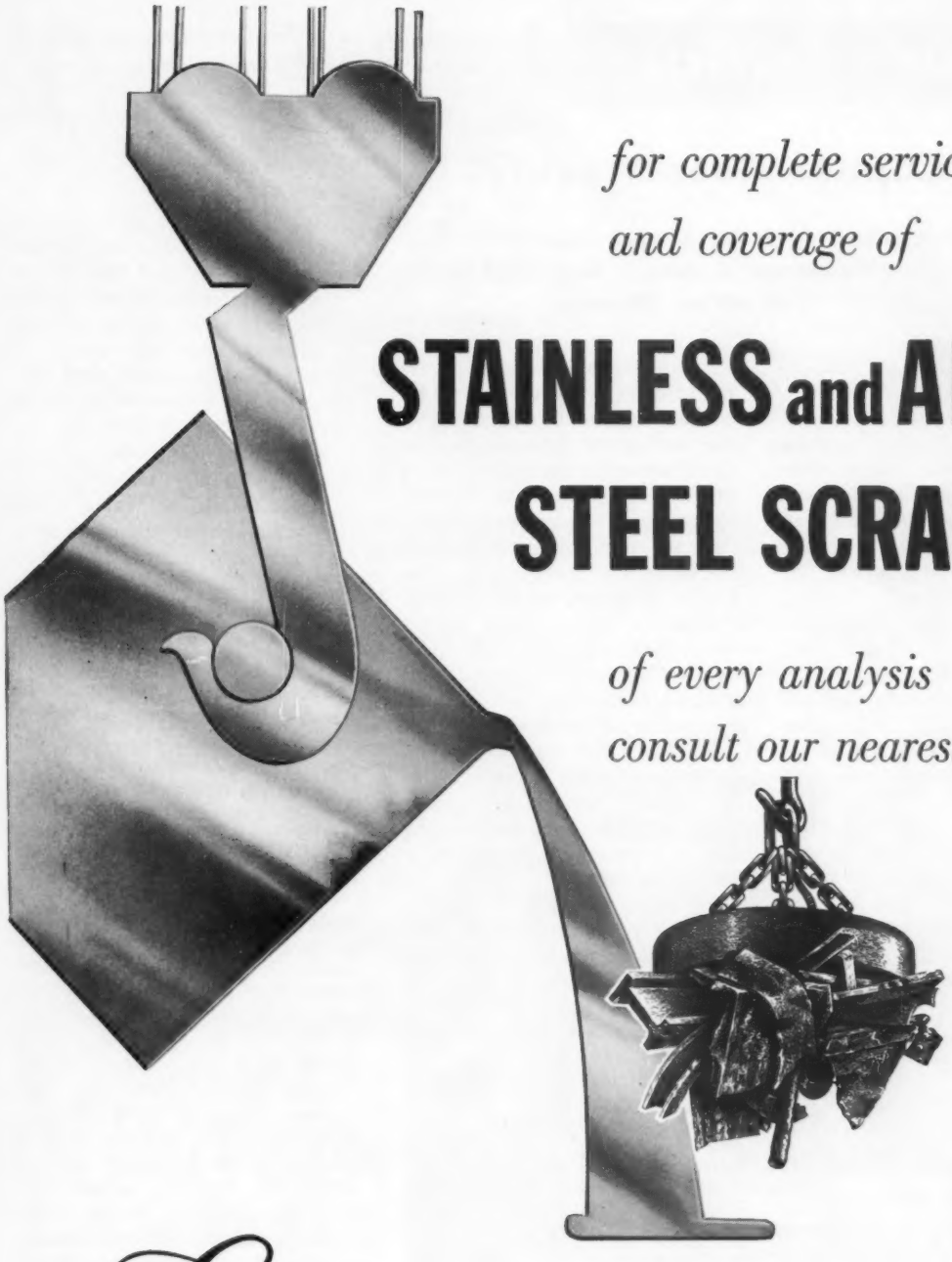
No. 1 hvy. melting	$38.00
No. 2 hvy. melting	32.00
No. 1 bundles	37.00
No. 2 bundles	28.00
No. 3 bundles	22.00
Machine shop turn.	18.00
Shoveling turnings	21.00
Cast iron borings	18.00
Elec. furn. 1 ft and under	38.00
No. 1 RR. hvy. melting	38.00
No. 1 cupola cast	44.00

Seattle

No. 1 hvy. melting	$38.00
No. 2 hvy. melting	35.00
No. 2 bundles	26.00
No. 3 bundles	20.00
No. 1 cupola cast	45.00
Mixed yard cast	45.00

Hamilton, Ont.

No. 1 hvy. melting	$49.50
No. 2 hvy. melting	45.50
No. 1 bundles	49.50
No. 2 bundles	42.00
Mixed steel scrap	43.50
Bushelings	39.50
Bush., new fact., prep'd	47.50
Bush., new fact., unprep'd	43.50
Machine shop turn.	18.00
Short steel turn.	27.50
Mixed bor. and turn.	$16.00 to 19.00
Rails, rerolling	54.50
Cast scrap	43.00 to 46.00



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IMPORT & EXPORT – **LIVINGSTON & SOUTHARD, INC.,** 99 Park Ave., New York, N. Y. • *Cable Address:* **FORENTRACO**

Braden Copper Goes Weekly

Kennecott's Chilean subsidiary, Braden Copper Co., will base U. S. price on weekly average of LME . . . Move might settle erratic market . . . Copper union will ask 20¢ more.

◆ KENNECOTT Copper has finally made public its decision to follow the Anaconda trend and base the price of copper from its Chilean subsidiary, Braden Copper Co., on the London Metals Exchange. Kennecott also followed Anaconda's example in leaving the exact procedure that would be followed up in the air.

Carl Lenz, president of Kennecott Sales Corp., flew to Chile for consultation with the Copper Dept. of Chilean Government. The initial announcement of the decision actually came from the Chilean Minister of Mines.

From preliminary discussion it seems that the main deviation from the Anaconda method will be the policy of basing the price on a weekly rather than a daily London Metals Exchange price.

While this switch will make it more difficult to accurately reflect the price of Chilean copper in the U. S., it might serve to help settle some of the headaches of copper fabricators.

Before the Anaconda move, the big problem was overcoming the lure of a higher European price. The Anaconda LME policy was aimed at curing that, but in effect substituted the problem of a different price every day, necessitating more costly estimating, averaging and bookkeeping. Under the Kennecott weekly average system the price would change every week instead of daily. This would minimize any unusual short term fluctuation not actually representative of market conditions.

The fact that the copper producers are taking different tacks in pricing their copper, an unusual situation, emphasizes that this is a period of transition in the copper market.

Annual convention of the International Union of Mine, Mill and Smelter Workers held recently in Salt Lake City has given the domestic copper producers an idea of what they can expect over the bargaining tables in May. The union put together a program which will be used as the keystone for each local. According to the union, additional requests can be made in line with specific local conditions as long as they don't conflict with the overall program.

Heading the list is a uniform general pay hike of about 20¢ per hour, lost time pay through an insurance program for workers involuntarily idled, and elimination of present wage differentials in the Southwest. Union shop will come up for discussion in plants that do not already have it.

An improvement in pension benefits will play a big part in negotiations, in contracts which open this subject for discussion. This does not include Kennecott or Anaconda. These companies are currently paying $1.75 per month for each year of service with some limitations.

Phelps Dodge, American Smelting & Refining, and several others will be asked to pay $2.50 per month for each year of service with no limitations.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in March based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper		Straits tin, New York	100.665
Del'd Conn. Valley	46.00	Zinc, E. St. Louis	13.50
Lake copper, delivered	46.00	Lead, St. Louis	15.80

Note: Quotations are going prices.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Mar. 28	Mar. 29	Mar. 30	Mar. 31	Apr. 2	Apr. 3
Copper, electro, Conn.	46.00	46.00	46.00	....	46.00	46.00
Copper, Lake, delivered	46.00	46.00	46.00	....	46.00	46.00
Tin, Straits, New York	100.375	100.00	101.125	....	100.375	100.375*
Zinc, East St. Louis	13.50	13.50	13.50	....	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	....	15.80	15.80

Note: Quotations are going prices. **Tentative*

ALUMINUM . . . Primary production continues on its merry pace, although February statistics show a slight drop from January. Over 280 million lb were turned out the first month of 1956 as compared to 265 million lb in the second month. The total for the first two months of 1956 far outstrips 1955, 546 million lb to 488 million lb.

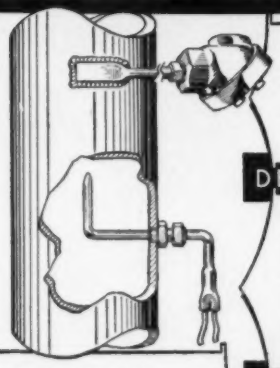
Pacific Gas & Electric Co. late last week completed negotiations with Aluminum Co. of America for the purchase of 145 miles of aluminum transmission line. The company declared that the new line would be used to replace copper wires already installed. It estimates that the 4 million lb of aluminum involved in the transfer would permit them to take down and salvage about 7 million lb of copper cable. No disruption of the copper scrap market is expected since the project will be accomplished gradually.

A job reclassification program provided for in last summer's negotiations between Aluminum Co. of America and United Steelworkers will result in an average pay boost of 7¢ per hour for about 11,000 workers. The raise will be retroactive to August 1, 1955.

*SWAGED MGO

FOR OPERATING TEMPERATURES −300 to 2000°F

INSULATED THERMOCOUPLES



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LEAD WIRE with QUICK DISCONNECT

- Available in long lengths or spliced together to meet your length requirements.

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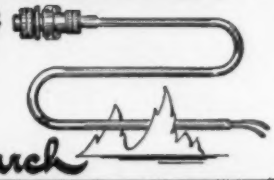

*SWAGED MgO wire is available from our stock—Diam. .025 to 5/16". Send for Bulletin 4.

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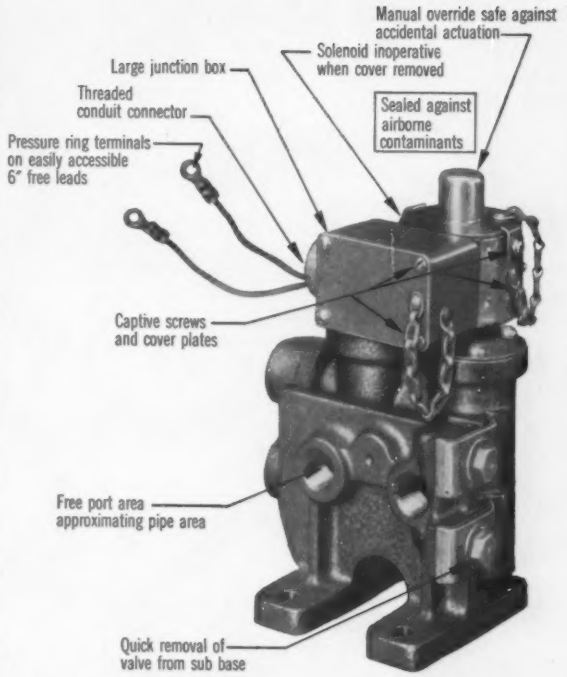
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Threaded conduit connector
Sealed against airborne contaminants
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For Machine Designers Who Want More Than Just 'JIC' Compliance, the Crescent® 4-Way Valve

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Pointed out on the photo above are the JIC features which are a must for many equipment manufacturers to gain acceptance of their machines in a growing number of production conscious plants. However, they offer obvious advantages even where they are not specifically demanded. Furthermore the JIC type Crescent solenoid is completely interchangeable with standard solenoids for the convenience of those manufacturers who want the JIC features available only for required application.

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With all its superior operating features the Crescent valve is probably the most competitively priced line on the market, particularly in the light of liberal trade and quantity discounts.

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Space, labor and materials savings have been pointed out to us by many equipment manufacturers as benefits from Crescent's compact design.

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NO COIL BURNOUT

Short stroke, pilot operation and a generous power margin prevent overheating, overloading and the resultant coil burnout.

Write for Catalog 6-C

BARKSDALE VALVES

5125 Alcoa Avenue, Los Angeles 58, California

Nonferrous Prices *(Effective April 3, 1956)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136–.249	.250–3.
1100, 3003	42.3	40.2	39.0	38.0
5052	49.8	44.9	43.2	41.4
6061–0	46.9	42.7	40.9	40.8

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6–8	43.1–44.8	58.1–61.7
12–14	43.8–45.2	59.0–63.3
24–26	46.8–47.2	69.2–73.6
36–38	55.1–55.7	92.0–95.8

Screw Machine Stock—2011-T-3

Size"	¼	⅜–⅝	¾–1	1¼–1½
Price	56.0	54.9	53.6	51.6

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length" →	72	96	120	144
.019 gage	$1.310	$1.742	$2.175	$2.605
.024 gage	1.630	2.177	2.707	3.247

MAGNESIUM

(f.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type → Gage→	.250–3.00	.250–2.00	.125	.064	.032
AZ31A Stand. Grade	.....	61	63.5	78	99
AZ31A Spec.	.....	79	83	100	145
Tread Plate	64	.....	68	.....	.....
Tooling Plate	65	.....	.....	.....	.....

Extruded Shapes

	1" diam. rod	shapes lb/ft 0.3	1.0	4.0	2" OD x ⅛" W. tubing
Comm. Grade (FS)	61.50	65.4–72.4	61.9–67.3	57.7–62.2	74.5
Spec. Grade (AZ31B)	73	76.9–83.9	73.4–78.8	69.2–73.7	86

Alloy Ingot

AZ91B (Die Casting) ..... 31 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 36 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	102	83	99
Strip, CR	102	92	125
Rod, Bar, HR	87	74	93
Angles, HR	87	74	93
Plate, HR	97	87	95
Seamless tube	122	110	153
Shot, Blocks	...	71	...

COPPER, BRASS, BRONZE

(Freight included on 500 lbs)

	Sheet	Wire	Rod	Tube
Copper	70.63	.....	.....	70.32
Brass, 70/30	57.60	58.14	.....	60.51
Brass, Low	62.55	63.09	62.49	65.36
Brass, R L	64.34	64.88	64.28	67.15
Brass, Naval	60.70	65.96	55.01	63.86
Muntz Metal	58.74	52.75	54.55	.....
Comm. Bz.	66.68	67.22	66.62	69.24
Mang. Bz.	64.44	67.09	58.54	.....
Phos. Bz. 5%	88.22	85.87	88.72	.....

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $13.10-$13.60; alloy $15.25-$15.75; Plate, HR, commercially pure, $10.50-$11.00; alloy, $11.50-$12.00. Wire, rolled and/or drawn, commercially pure, $9.50-$11.50; alloy, $11.50; Bar, HR or forged, commercially pure, $7.90-$8.15; alloy, $7.90-$8.10.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb. freight allowed 25.90
Aluminum pig 24.00
Antimony, American, Laredo, Tex. 33.50
Beryllium copper, per lb conta'd Be $43.00
Beryllium aluminum 5% Be, Dollars per lb contained Be $74.75
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Cobalt, 97-99% (per lb) ..... $2.60 to $2.67
Copper, electro, Conn. Valley 46.00
Copper, Lake, delivered 46.00
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9% dollars per troy oz. $ 2.25
Iridium, dollars per troy oz. ..... $100 to $120
Lead, St. Louis 15.80
Lead, New York 16.00
Magnesium, 99.8+%, f.o.b. Velasco, Tex., 10,000 lb, pig 32.50
ingot 33.25
Magnesium, sticks, 100 to 500 lb. 53.00
Mercury, dollars per 76-lb flask, f.o.b. New York ..... $258 to $260
Nickel electro 64.50
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 60.75
Palladium, dollars per troy oz. $23 to $24
Platinum, dollars per troy oz. $97 to $107
Silver, New York, cents per troy oz. 91.25
Tin, New York 100.375*
Titanium sponge, grade A-1 $3.15 to $3.45
Zinc, East St. Louis 13.50
Zinc, New York 14.00
Zirconium sponge $10.00
*Tentative

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot
No. 115 ..... 44.00
No. 120 ..... 43.00
No. 123 ..... 42.00
80-10-10 ingot
No. 305 ..... 47.75
No. 315 ..... 46.00
88-10-2 ingot
No. 210 ..... 60.75
No. 215 ..... 56.75
No. 245 ..... 50.75
Yellow ingot
No. 405 ..... 34.75
Manganese bronze
No. 421 ..... 39.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 31.50-32.50
0.60 copper max. 31.25-32.25
Piston alloys (No. 122 type) 32.50-33.50
No. 12 alum. (No. 2 grade) 30.00-31.00
108 alloy 30.00-30.50
195 alloy 31.50-32.50
13 alloy (0.60 copper max.) 31.25-32.25
AXS-679 ..... 30.00-30.50

Steel deoxidizing aluminum, notch bar granulated or shot
Grade 1—95-97½% 29.50-31.25
Grade 2—92-95% 29.00-30.25
Grade 3—90-92% 28.50-29.50
Grade 4—85-90% 28.00-29.00

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	45	44¼
Yellow brass	33¼	30¾
Red brass	39½	38¾
Comm. bronze	41¼	40½
Mang. bronze	30¾	30
Yellow brass rod ends	33	....

Custom Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 44
No. 2 copper wire 42½
Light copper 40
*Refinery brass 40
* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 44
No. 2 copper wire 42½
Light copper 40
No. 1 composition 36½
No. 1 comp. turnings 36
Hvy. yellow brass solids 26
Brass pipe 27
Radiators 28½

Aluminum

Mixed old cast. ..... 20 —21
Mixed new clips ..... 21 —22
Mixed turnings, dry ..... 20½—21½

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire. 41 —42
No. 2 heavy copper and wire. 38½—39
Light copper ..... 37 —37½
New type shell cuttings ..... 36½—37
Auto radiators (unsweated) .. 23½—24
No. 1 composition ..... 31½—32
No. 1 composition turnings .. 30 —30½
Unlined red car boxes ..... 24 —24½
Cocks and faucets ..... 27 —27½
Clean heavy yellow brass .... 21½—22
Brass pipe ..... 26½—27½
New soft brass clippings .... 27½—28
No. 1 brass rod turnings .... 25 —25½

Aluminum

Alum. pistons and struts .... 17 —17½
Aluminum crankcases ..... 16¾—17¼
1100 (2S) aluminum clippings 19½—20
Old sheet and utensils ..... 16¾—17¼
Borings and turnings ..... 11½—12
Industrial castings ..... 16¾—17¼
2024 (24S) clippings ..... 18 —18½

Zinc

New zinc clippings ..... 8½— 9
Old zinc ..... 6 — 6½
Zinc routings 4¼
Old die cast scrap 3½

Nickel and Monel

Pure nickel clippings $1.50
Clean nickel turnings $1.25
Nickel anodes $1.50
Nickel rod ends $1.50
New Monel clippings 60
Clean Monel turnings 50
Old sheet Monel 55
Nickel silver clippings, mixed. 25
Nickel silver turnings, mixed 21

Lead

Soft scrap lead ..... 12½—13
Battery plates (dry) ..... 7 — 7¼
Batteries, acid free 4½

Miscellaneous

Block tin ..... 84 —85
No. 1 pewter ..... 66 —67
Auto babbitt ..... 43½—44½
Mixed common babbitt 15½
Solder joints ..... 20 —20½
Siphon tops 50
Small foundry type ..... 16¼—16½
Monotype ..... 15½—16
Lino. and stereotype ..... 14½—15
Electrotype ..... 13 —13½
Hand picked type shells .... 10½—11
Lino. and stereo. dross ..... 5¾— 6
Electro. dross ..... 4¾— 5

IRON AGE

STEEL PRICES

(Effective April 3, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$96.00 *B3*		4.65 *B3*	6.80 *B3*	4.65 *B3*						
	Buffalo, N. Y.	$68.50 *B3*	$84.50 *R3, B3*	$96.00 *R3, B3*	5.45 *B3*	4.65 *B3*	6.80 *B3*	4.65 *B3*	4.325 *R3,B3*	6.25 *B3* 6.25 *R7,S10*	6.425 *B3*	9.10 *B3*		
	Claymont, Del.													
	Harrison, N. J.													13.45 *C11*
	Conshohocken, Pa.								4.375 *A2*	6.30 *A3*	6.425 *A3*			
	New Bedford, Mass.									6.70 *R6*				
	Johnstown, Pa.	$68.50 *B3*	$84.50 *B3*	$96.00 *B3*		4.65 *B3*	6.80 *B3*							
	Boston, Mass.									6.80 *T8*				13.80 *T8*
	New Haven, Conn.									6.70 *D1* *A5*				
	Phoenixville, Pa.					5.15 *P2*		5.15 *P2*						
	Sparrows Pt., Md.								4.325 *B3*	6.25 *B3*	6.425 *B3*	9.10 *B3*		
	Bridgeport, Wallingford, Conn.	$73.50 *N8*	$89.50 *N8*						4.625 *N8*	6.70 *W1*			7.50 *N8*	
	Pawtucket, R. I. Worcester, Mass.									6.80 *N7* *A5*				*A5* 13.80 *N7*
MIDDLE WEST	Alton, Ill.								4.50 *L1*					
	Ashland, Ky.								4.325 *A7*					
	Canton-Massillon, Dover, Ohio		$86.50 *R3*	$96.00 *R3*										13.45 *G4*
	Chicago, Ill.	$68.50 *U1*	$84.50 *R3, U1,W8*	$96.00 *R3, U1,W8*	5.45 *U1*	4.60 *U1, W8*	6.75 *U1, Y1*	4.60 *U1*	4.55 *A1* 4.325 *N4,W8*	6.35 *A1,T8*			7.20 *W8*	13.45 *T8*
	Cleveland, Ohio									6.25 *A5,J3*		9.30 *A5*		13.45 *A5*
	Detroit, Mich.			$96.00 *R5*					4.625 *G3,M3*	6.35 *D1,D2, G3,M2,P11*	6.525 *G3*	9.20 *D2, G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$68.50 *U1*	$84.50 *U1*	$96.00 *U1, Y1*	5.45 *I3*	4.60 *U1, I3*	6.75 *U1, I3*		4.325 *I5, U1,Y1*	6.35 *I3* 6.25 *Y1*	6.425 *I3, U1,Y1*	9.30 *Y1*	7.20 *Y1, U1*	
	Sterling, Ill.								4.425 *N4*					
	Indianapolis, Ind.									6.45 *C9*				
	Newport, Ky.												7.20 *N5*	
	Middletown, Ohio									6.45 *A7*				
	Niles, Warren, Ohio Sharon, Pa.	$68.50 *C10*	$84.50 *C10*	$96.00 *C10*					4.325 *S1, R3*	6.25 *S1, R3,T4*	6.425 *S1, R3*	9.10 *S1, R3*	7.20 *S1*	13.45 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$68.50 *U1, J3*	$84.50 *J3, U1,C11*	$96.00 *U1, C11*	5.45 *U1*	4.60 *U1, J3*	6.75 *U1, J3*	4.60 *U1*	4.325 *P8*	6.25 *S7,B4*			7.20 *S9*	13.45 *S9*
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.					4.60 *W3*			4.325 *W3*	6.25 *P3,W3*	6.425 *W3*	9.10 *W3*		
	Youngstown, Ohio		$84.50 *C10*	$96.00 *Y1, C10*			6.75 *Y1*		4.325 *U1, Y1*	6.25 *Y1,C9*	6.425 *U1, Y1*	9.30 *Y1*	7.20 *U1, Y1*	13.45 *C9*
WEST	Fontana, Cal.	78.00 *K1*	94.00 *K1*	117.00 *K1*		5.30 *K1*	7.40 *K1*	5.45 *K1*	5.125 *K1*	8.00 *K1*	7.575 *K1*		8.95 *K1*	
	Geneva, Utah		$84.50 *C7*			4.60 *C7*	6.75 *C7*							
	Kansas City, Mo.					4.70 *S2*	6.85 *S2*				6.675 *S2*		7.45 *S2*	
	Los Angeles, Torrance, Cal.		$94.00 *B2*	$116.00 *B2*		5.30 *C7, B2*	7.45 *B2*		5.075 *C7, B2*	8.30 *C1*			8.40 *B2*	
	Minnequa, Colo.					4.90 *C6*			5.425 *C8*					
	Portland, Ore.					5.35 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$94.00 *B2*			5.25 *B2, P9*	7.40 *B2*		5.075 *B2, C7*					
	Seattle, Wash.		$98.00 *B2*			5.35 *B2*	7.50 *B2*		5.325 *B2*					
SOUTH	Atlanta, Ga.								5.325 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$68.50 *T2*	$84.50 *T2*			5.10 *C16* 4.60 *R3,T2*	6.75 *T2*		4.325 *R3,T2* 4.825 *C16*		6.425 *T2*			
	Houston, Lone Star, Tex.	$74.50 *L3*	$89.50 *S2*	$101.00 *S2*		4.70 *S2*	6.85 *S2*				6.675 *S2*		7.45 *S2*	

STEEL PRICES

(Effective April 3, 1956)

Italics identify producers listed in key at end of table. Base prices, fo.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *10* ga. & hvyr.	Cold-rolled	Galvanized *10* ga.	Enameling *12* ga.	Long Terne *10* ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Coke* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Hollowaro Enameling *29* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.325 *B3*	5.325 *B3*				6.375 *B3*	7.875 *B3*			5.375 *W6*	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	4.375 *A2*	5.375 *A2*				6.425 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.375 *B3*			
	Fairless, Pa.	4.375 *U1*	5.375 *U1*				6.425 *U1*	7.925 *U1*				$9.30 *U1*	$8.00 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.325 *B3*	5.325 *B3*	5.85 *B3*			6.375 *B3*	7.875 *B3*	8.60 *B3*		5.475 *B3*	$9.30 *B3*	$8.00 *B3*	
	Worcester, Mass.										5.675 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										5.55 *L1*			
	Ashland, Ky.	4.325 *A7*		5.85 *A7*	5.90 *A7*									
	Canton-Massillon, Dover, Ohio			5.85 *R1, R3*										
	Chicago, Joliet, Ill.	4.55 *A1* 4.325 *W8*					6.375 *U1*				5.375 *N4* 5.375 *A5, R3*			
	Sterling, Ill.										5.475 *N4*			
	Cleveland, Ohio	4.325 *J3, R3*	5.325 *J3, R3*		5.90 *R3*		6.375 *J3, R3*	7.875 *J3, R3*			5.375 *A5*			
	Detroit, Mich.	4.425 *G3, M2*	5.425 *G3* 5.325 *M2*				6.475 *G3*	7.975 *G3*						
	Newport, Ky.	4.325 *N5*	5.325 *N5*	5.85 *N5*										
	Gary, Ind. Harbor, Indiana	4.325 *J3, U1, Y1*	5.325 *J3, U1, Y1*	5.85 *U1, J3*	5.90 *U1, J3*	6.25 *U1*	6.375 *Y1, U1, J3*	7.875 *U1, Y1*			5.375 *Y1*	$9.20 *J3, U1, Y1*	$7.90 *J3, U1, Y1*	6.65 *U1, Y1*
	Granite City, Ill.	4.525 *G2*	5.525 *G2*	6.05 *G2*	6.10 *G2*								$8.00 *G2*	6.75 *G2*
	Kokomo, Ind.			5.95 *C9*							5.475 *C9*			
	Mansfield, Ohio	4.325 *E2*	5.325 *E2*			6.25 *E2*				*E2*				
	Middletown, Ohio		5.325 *A7*	5.85 *A7*	5.90 *A7*	6.25 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.325 *S1, R3, N3*	5.325 *R3, N3*	5.85 *R3* 6.05 *N3*	5.90 *N3*	6.25 *N3*	6.375 *S1, R3*	7.875 *R3*				$9.20 *R3*	$7.90 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 *J3, U1, P6*	5.325 *J3, U1, P6*	5.85 *U1*	5.90 *U1, A7*		6.375 *J3, U1*	7.875 *U1*	8.60 *U1*		5.025 *P6* 5.375 *A5*	$9.20 *J3, U1*	$7.90 *J3, U1*	6.65 *U1*
	Portsmouth, Ohio	4.325 *P7*	5.325 *P7*								5.375 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.325 *W3, W5*	5.325 *W3, W5, F3*	5.85 *W3, W5*		6.25 *W3, W5*	6.375 *W3*	7.875 *W3*				$9.20 *W3, W5*	$7.90 *W3, W5*	6.65 *F3, W5*
	Youngstown, Ohio	4.325 *U1, Y1*	5.325 *Y1*		5.90 *Y1*		6.375 *U1, Y1*	7.875 *Y1*			5.375 *Y1*			
WEST	Fontana, Cal.	5.125 *K1*	6.525 *K1*				7.175 *K1*	9.075 *K1*						
	Geneva, Utah	4.425 *C7*												
	Kansas City, Mo.										5.625 *S2*			
	Los Angeles, Torrance, Cal.										6.175 *B2*			
	Minnequa, Colo.										5.625 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.025 *C7*	6.275 *C7*	6.00 *C7*							5.675 *C7*	$9.95 *C7*	$8.65 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.325 *R3, T2*	5.325 *T2*	5.85 *R3, T2*			6.375 *T2*			5.625 *R3*	5.025 *R3,* 5.375 *T2*	$9.30 *T2*	$8.00 *T2*	
	Houston, Tex.										5.625 *S2*			

IRON AGE

STEEL PRICES

(Effective April 3, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Merchant	Reinforc-ing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.S. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				5.575 *B3*	7.425 *B3*	6.80 *B3*					
	Buffalo, N. Y.	4.65 *B3,R3*	4.65 *B3,R3*	6.30 *B5*	5.575 *B3,R3*	7.425 *B3,B5*	6.80 *B3*	4.50 *B3,R3*				6.60 *W6*
	Claymont, Del.							4.80 *C4*		6.30 *C4*	6.725 *C4*	
	Coatesville, Pa.							4.80 *L4*		6.30 *L4*	6.725 *L4*	
	Conshohocken, Pa.							4.50 *A2*	5.575 *A2*		6.725 *A2*	
	Harrisburg, Pa.							5.10 *P2*	5.575 *C3*			
	Hartford, Conn.			6.75 *R3*		7.725 *R3*						
	Johnstown, Pa.	4.65 *B3*	4.65 *B3*		5.575 *B3*		6.80 *B3*	4.50 *B3*		6.30 *B3*	6.725 *B3*	6.60 *B3*
	Fairless, Pa.	4.80 *U1*	4.80 *U1*		5.725 *U1*							
	Newark, N. J.			6.70 *W10*		7.60 *W10*						
	Camden, N. J.			6.70 *P10*								
	Bridgeport, Putnam, Conn.	4.80 *N8*		6.80 *W10*	5.725 *N8*			4.750 *N8*				
	Sparrows Pt., Md.		4.65 *B3*					4.50 *B3*		6.30 *B3*	6.725 *B3*	6.70 *B3*
	Palmer, Worcester, Readville, Mass. Milton, Pa.	4.80 *M7*	4.80 *M7*	6.70 *W11* 6.45 *C14* 6.70 *B5*		7.725 *A5,B5*		4.50 *R3*				6.90 *A5* 6.90 *W6*
	Spring City, Pa.			6.35 *K4*		7.80 *K4*						
MIDDLE WEST	Alton, Ill.	4.85 *L1*										6.775 *L1*
	Ashland, Newport, Ky.							4.50 *A7,N5*		6.30 *N5*		
	Canton-Massillon, Mansfield, Ohio	4.75 *R3*		6.25 *R2,R3*	5.575 *R3,T5*	7.425 *R2,R3, T5*		4.50 *E1*				
	Chicago, Joliet, Ill.	4.65 *U1, N4,W8,R3,* 5.15 *P13*	4.65 *N4,R3,* 5.15 *P13*	6.25 *B5,W8, W10,A5,L2*	5.575 *U1,R3, W8*	7.425 *A5,W8, W10,L2,B5*		4.50 *U1,W8, I3,R3* 4.725 *A1*	5.575 *U1*	6.30 *U1*	6.725 *U1*	6.60 *A5,R3, N4,W7*
	Cleveland, Ohio	4.65 *R3*	4.65 *R3*	6.25 *A5,C13*		7.425 *A5,C13*	6.80 *R3*	4.60 *J3,R3*	5.575 *J3*		6.725 *R3,J3*	6.60 *A5, C13*
	Detroit, Mich.	4.75 *G3*	4.75 *G3*	5.90 *R5* 6.45 *B5* 6.15 *P3* 6.10 *P8*	5.575 *R5* 5.675 *G3*	7.425 *R5* 7.625 *B5,P3, P8*	6.90 *G3*	4.60 *G3*			6.825 *G3*	
	Duluth, Minn.											6.60 *A5*
	Gary, Ind. Harbor, Crawfordsville	4.65 *I3, U1, Y1*	4.65 *I3, U1, Y1*	6.25 *M5,R3*	5.575 *I3, U1, Y1*	7.425 *M5, R3*	6.80 *U1,I3, Y1*	4.50 *I3, U1,Y1*	5.575 *I3*	6.30 *U1,Y1*	6.725 *U1, I3,Y1*	6.35 *M4*
	Granite City, Ill.							4.70 *G2*				
	Kokomo, Ind.											6.70 *C9*
	Sterling, Ill.	4.75 *N4*	4.75 *N4*									6.70 *N4*
	Niles, Warren, Ohio Sharon, Pa.	4.65 *R3,C10*		6.25 *C10*	5.575 *C10*	7.425 *C10*	6.80 *R3*	4.50 *S1,R3*		6.30 *S1*	6.725 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.65 *J3, U1, C11*	4.65 *J3, U1*	6.25 *A5,C8, C11,J3, W10,B4,R3*	5.575 *U1,C11*	7.425 *A5,C11, W10,C8,R3*	6.80 *J3, U1*	4.50 *J3, U1*	5.575 *U1*	6.30 *U1*	6.725 *J3, U1*	6.80 *A5,J3, P6*
	Portsmouth, Ohio											6.60 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.65 *W3*						4.50 *W3,W5*				
	Youngstown, Ohio	4.65 *U1,Y1, C10,R3*	4.65 *U1,Y1, R3*	6.25 *Y1, U1*	5.575 *U1,Y1, C10*	7.425 *Y1,C10, F2*	6.80 *U1,Y1*	4.50 *U1,Y1, R5*		6.30 *Y1*	6.725 *Y1*	6.60 *Y1*
WEST	Emeryville, Cal.	5.40 *J5*	5.40 *J5*									
	Fontana, Cal.	5.35 *K1*	5.35 *K1*		6.625 *K1*		7.50 *K1*	5.20 *K1*		7.00 *K1*	7.375 *K1*	
	Geneva, Utah							4.90 *C7*			6.725 *C7*	
	Kansas City, Mo.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*					6.85 *S2*
	Los Angeles, Torrance, Cal.	5.35 *B2,C7*	5.35 *B2,C7*	7.70 *R3*	6.625 *B2*		7.50 *B2*				7.625 *B2*	7.55 *B2*
	Minnequa, Colo.	5.10 *C6*	5.10 *C6*					5.35 *C6*				6.85 *C6*
	Portland, Ore.	5.40 *O2*	5.40 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.35 *C7* 5.40 *B2,P9*	5.35 *C7* 5.40 *B2,P9*				7.55 *B2*					7.55 *C7* 7.55 *C6*
	Seattle, Wash.	5.40 *B2,P12, N6*	5.40 *B2,P12*				7.55 *B2*	5.40 *B2*		7.20 *B2*	7.625 *B2*	
SOUTH	Atlanta, Ga.	4.85 *A8*	4.85 *A8*									6.80 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	4.65 *T2,R3* 5.15 *C16*	4.65 *T2,R3* 5.15 *C16*				6.80 *T2*	4.50 *T2,R3*			6.725 *T2*	6.80 *R3, T2*
	Houston, Ft. Worth, Lone Star, Tex.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*	4.85 *L3* 4.60 *S2*		6.40 *S2*	6.825 *S2*	6.85 *S2*

Steel Prices *(Effective April 3, 1956)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Disston & Sons, Inc., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G3 Granite City Steel Co., Granite City, Ill.
G5 Great Lakes Steel Corp., Detroit.
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Stee Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N J.
P11 Production Steel Strip Corp., Detroit
P12 Pacific Steel Rolling Mills, Seattle
P13 Phoenix Mfg. Co., Joliet, Ill.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Forth Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $280 per net ton

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																						
Sparrows Pt. *B3*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	18.50	1.25	21.50	5.25	24.00	8.75	26.50	10.00	27.00	11.00	27.50	11.50	29.00	11.75	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	6.00	13.25	9.00	+9.25	11.50	+5.75	14.00	+4.00	14.50	+3.00	15.00	+2.50	16.50	+1.75	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	18.50	1.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+6.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Alton, Ill. *L1*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+6.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Wheeling *W5*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+6.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Indiana Harbor *Y1*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.00	26.00	11.50	26.50	12.00	28.00	11.75	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+6.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *R3*	23.00	7.25	27.00	11.25	29.00	14.75	29.50	14.00	30.00	15.00	30.50	15.50	31.00	14.75	.....	.....	.....	.....	.....	.....	.....	.....
Fairless *N2*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75	.....	.....	.....	.....	.....	.....	.....	.....
Fontana *K1*	10.50	.....	14.50	.....	16.50	.....	17.00	.....	17.50	.....	18.00	.....	18.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *J3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	29.50	6.75
Alton, Ill. *L1*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75	.....	.....	.....	.....	.....	.....	.....	.....
Sharon *M3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	.....	.....	.....	.....	.....	.....	.....	.....
Pittsburgh *N1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	29.50	6.75
Wheeling *W5*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	.....	.....	.....	.....	.....	.....	.....	.....
Wheatland *W4*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown *Y1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	29.50	6.75
Indiana Harbor *Y1*	22.00	8.25	26.00	12.25	28.00	15.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75	.....	.....	.....	.....	.....	.....	.....	.....
Lorain *N2*	21.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	29.50	6.75

Threads only, buttweld and seamless 2½ pt higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2 in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 11¢ to 13¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb
18	4	1	—	—	$1.60
18	4	1	—	5	2.305
18	4	2	—	—	1.765
1.5	1	1.5	8	—	.96
6	4	3	6	—	1.35
6	4	2	5	—	1.105

High-carbon chromium ..... .77
Oil hardened manganese ..... .43
Special carbon ..... .39
Extra carbon ..... .33
Regular carbon ..... .275

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*A3, J2, L4*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	304	30.30	33.15	36.05	32.50
	316	35.50	38.45	41.40	47.00
	321	32.00	34.85	37.75	37.25
	347	34.40	37.90	41.40	48.25
	405	25.80	29.60	33.35	.....
	410, 430	25.30	29.10	32.85	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 33.00; 1 side, 30.00.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	8.40	8.60	.....
Armature	9.35	9.60	10.10
Elect.	9.95	10.20	10.70
Motor	10.95	11.20	11.70
Dynamo	11.85	12.10	12.60
Trans. 72	12.80	13.05	13.55
Trans. 65	13.35	Grain Oriented	
Trans. 58	13.85	Trans. 80	17.45
Trans. 52	14.85	Trans. 73	17.95

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*)

* Coils 75¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight changes for seller's account.

Gross Ton

Openhearth lump	$12.10
Old range, bessemer	11.25
Old range, nonbessemer	11.10
Mesabi, bessemer	11.00
Mesabi, nonbessemer	10.85
High phosphorus	10.85

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence 9–15½ ga. Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Am'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	152	162	...	173	175	7.40	7.80
Aliquippa, Pa. *J3*	152	162	...	...	...	7.40	7.80
Atlanta *A8*	154	167	...	177	180	7.60	8.125
Bartonville *K2**	154	168	...	175	181	7.60	8.20
Buffalo *W6*	...	...	...	...	...	7.40	7.80
Chicago, Ill. *N4***	152	166	...	175	179	7.50	8.10
Cleveland *A6*	157	...	...	...	...	7.50	.....
Cleveland *A5*	...	...	...	...	...	7.40	.....
Crawfordsville *M4**	154	168	...	177	181	7.60	8.20
Donora, Pa. *A5*	152	162	...	175	175	7.50	7.90
Duluth *A5*	152	162	...	175	175	7.50	7.90
Fairfield, Ala. *T2*	152	162	...	175	175	7.50	7.90
Galveston *D4*	157	...	...	...	...	...	.....
Houston *S2*	157	170	...	...	180	7.65	8.05
Johnstown, Pa. *B3**	152	166	...	...	175	7.40	7.80
Joliet, Ill. *A5*	152	162	...	175	175	7.50	7.90
Kokomo, Ind. *C9*	154	154	...	177	177	7.60	8.00
Los Angeles *B2**	...	...	...	...	...	8.35	8.925
Kansas City *S2*	157	167	...	178	180	7.65	8.05
Minnequa *C6*	157	167	162	178	180	7.65	8.05
Monessen *P6*	152	162	...	...	...	7.40	7.80
Moline, Ill. *R3*	...	162	162	...	...	...	.....
Pittsburg, Cal. *C7*	171	185	...	199	195	8.45	8.85
Portsmouth *P7*	...	...	...	...	...	7.40	.....
Rankin, Pa. *A5*	152	162	...	...	175	7.40	7.90
So. Chicago *R3*	152	162	157	173	175	7.40	7.80
S. San Francisco *C6*	...	...	...	197	195	8.35	8.75
Sparrows Pt. *B3**	154	...	...	175	181	7.50	8.075
Struthers, O. *Y1*	...	...	...	...	...	7.40	7.90
Worcester *A5*	158	...	...	...	...	7.70	8.20
Williamsport, Pa. *S5*	...	...	160	...	...	...	.....

Galvanized products computed with zinc at 5¢ per lb
Exceptions: *zinc at 12.5¢ per lb; **13¢ zinc.

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery Charge **	Sheets Hot-Rolled	Cold-Rolled	Galvanized (10 gage)	Strip Hot-Rolled	Cold-Rolled	Plates	Shapes Standard Structural	Bars Hot-Rolled	Cold-Finished	Alloy Bars Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Baltimore	$.10	7.31	8.32	8.37	7.65	.....	7.63	7.93	7.61	8.62	14.38	13.44–13.96	16.36	16.29–16.49
Birmingham	.15	6.80	7.93	8.85	7.06	.....	6.99	7.28	7.08	9.35	.....	.....	.....	.....
Boston	.10	8.22	9.17	10.42	8.31	.....	8.51	8.37	8.37	[3]9.83	.....	13.66	.....	16.76
Buffalo	.15	7.35	8.40	10.16	7.50	.....	7.80	7.75	7.50	8.05	.....	13.45	.....	16.50
Chicago	.15	7.28	8.39	9.25	7.36	.....	7.60	7.58	7.42	7.90	.....	13.20	.....	16.30
Cincinnati	.15	7.40	8.38	9.10	7.60	.....	7.80	8.05	7.66	8.30	13.59	13.29	16.44	16.39
Cleveland	.15	7.28	8.39	9.10	7.46	.....	7.77	7.91	7.48	8.15	13.41	13.11	16.26	16.21
Denver	.....	8.60	10.76	11.22	8.90	.....	8.60	8.75	8.90	9.82	.....	.....	.....	17.97
Detroit	.15	7.47	8.58	9.53	7.49	.....	7.88	8.05	7.70	8.19	13.70	13.40	16.55	16.50
Houston	.....	7.85	8.75	10.49	8.15	.....	7.80	8.29	8.25	9.85–9.95	14.35	14.00	17.15	17.05
Kansas City	.20	7.47	8.76	9.17	7.73	.....	7.66	7.95	7.75	8.52	13.87	13.52	16.72	16.57
Los Angeles	.10	8.25	10.10	11.10	8.60	.....	8.85	8.40	8.25	11.00	.....	14.45	.....	18.00
Memphis	.10	7.12	8.25	.....	7.38	.....	7.31	7.60	7.40	9.15	.....	.....	.....	.....
Milwaukee	.15	7.37	8.48	9.34	7.45	.....	7.69	7.75	7.51	8.09	.....	13.29	.....	16.39
New Orleans	.15	7.28	8.35	.....	7.45	.....	7.40	7.70	7.50	9.55	.....	.....	.....	.....
New York	.10	7.88	8.98	9.73	8.33	.....	8.31	8.21	8.26	9.87	.....	13.57	.....	16.67
Norfolk	.20	7.25	.....	.....	7.65	.....	7.45	7.95	7.65	9.50	.....	.....	.....	.....
Philadelphia	.10	7.44	8.54	9.51	8.09	.....	7.82	7.85	7.83	8.62	.....	13.35	.....	16.45
Pittsburgh	.15	7.28	8.39	9.55	7.46	9.00	7.60	7.58	7.42	8.00	13.35	13.05	16.20	16.15
Portland	.....	7.80–8.60	8.80–10.15	10.65	8.00	7.95	7.75	7.85–8.15	7.95	12.20	.....	15.00	.....	17.50
Salt Lake City	.20	.....	10.60	.....	9.35	.....	.....	9.20	9.15	.....	.....	.....	.....	.....
San Francisco	.10	8.30	9.75	10.25	8.45	.....	8.40	8.35	8.25	11.55	.....	14.45	.....	18.00
Seattle	.00	8.75	10.50	10.90	8.90	.....	8.50	8.50	8.60	12.25	.....	14.65	.....	.....
St. Louis	.15	7.57	8.68	9.54	7.65	.....	7.89	7.95	7.71	8.44	.....	13.49	.....	16.59
St. Paul	.25	7.94	8.59–9.14	9.89	7.72	.....	7.65	7.94	7.74	8.51	.....	13.51	.....	16.31

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions: [1] 1500 to 9999 lb. [2] 1000 lb or over. [3] $.25 delivery. [4] 1000 to 1999 lb, $.25 delivery.

*Plus analysis charge. ‡Deduct for country delivery.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bristol, Conn. *W12*	.....	.....	10.80	12.95	15.65
Buffalo, N. Y. *R7*	7.00	8.95	10.50	12.65	15.35
Carnegie, Pa. *S9*	.....	9.05	10.60	12.75	15.35
Cleveland *A5*	7.10	9.05	10.60	12.75	15.45
Detroit *D1*	7.20	9.15	10.70	12.85	.....
Detroit *D2*	7.20	9.15	10.70	.....	.....
Harrison, N. J. *C11*	.....	.....	10.90	13.05	15.75
Indianapolis *C5*	7.15	9.10	10.50	12.65	15.35
New Castle, Pa. *B4*	7.00	8.95	10.50	12.65	.....
New Haven, Conn. *D1*	7.55	9.35	10.90	13.05	.....
Pawtucket, R. I. *N7*	7.65	9.35	10.90	13.05	15.75
Pittsburgh *S7*	7.10	9.05	10.60	12.75	15.45
Riverdale, Ill. *A1*	7.20	9.05	10.60	12.75	15.45
Sharon, Pa. *S1*	7.10	9.05	10.60	12.75	15.45
Trenton *R4*	.....	.....	.....	.....	.....
Wallingford *W1*	7.45	9.25	10.80	12.95	15.65
Warren, Ohio *T4*	7.00	8.95	10.50	12.65	15.35
Weirton, W. Va. *W3*	7.10	8.95	10.50	.....	.....
Worcester, Mass. *A5*	7.65	9.35	10.90	13.05	15.75
Youngstown *C5*	7.00	8.95	10.50	12.65	15.35

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	30.87	36.51	29.93	.....
	2½	12	41.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
National Tube	2	13	30.87	36.51	29.93	.....
	2½	12	42.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
Pittsburgh Steel	2	13	30.87	36.51	.....	.....
	2½	12	41.57	49.16	.....	.....
	3	12	47.99	56.76	.....	.....
	3½	11	56.03	66.27	.....	.....
	4	10	74.41	88.00	.....	.....

(Effective April 3, 1956)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	4.725	5.65	5.825				
So. Chicago *R3*				8.05			
Ensley *T3*	4.725	5.65					
Fairfield *T3*		5.65		7.90		5.625	
Gary *U1*	4.725	5.65				5.625	
Ind. Harbor *I3*	4.725		5.825	7.90		5.625	
Ind. Harbor *Y1*				7.90			
Johnstown *B3*		5.65					
Joliet *U1*		5.65	5.825				
Kansas City *S2*				7.90			
Lackawanna *B3*	4.725	5.65	5.825			5.625	
Lebanon *B3*							12.15
Minnequa Ck.	4.725	6.15	5.825	7.90		5.625	12.15
Pittsburgh *O1*					11.90		12.15
Pittsburgh *P5*							12.15
Pittsburgh *J3*				7.90			
Seattle *B2*				8.40		5.775	12.65
Steelton *B3*	4.725		5.825			5.625	
Struthers *Y1*				7.90			
Torrance *C7*						5.775	
Williamsport *S5*		5.65					
Youngstown *R3*				8.05			

COKE

	Net-Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	$14.50
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$17.00 to $18.00
Foundry, oven coke	
Buffalo, del'd	$28.75
Chicago, f.o.b.	27.00
Detroit, f.o.b.	27.50
New England, del'd	28.55
Seaboard, N. J., f.o.b.	26.75
Philadelphia, f.o.b.	26.50
Swedeland, Pa., f.o.b.	26.50
Painesville, Ohio, f.o.b.	27.50
Erie, Pa., f.o.b.	27.50
Cleveland, del'd	29.43
Cincinnati, del'd	28.59
St. Paul, f.o.b.	26.50
St. Louis, f.o.b.	28.50
Birmingham, f.o.b.	25.65
Lone Star, Tex., f.o.b.	19.50

ELECTRODES

Cents per lb f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	23.00	40	100, 110	9.90
20	72	22.25	35	110	9.90
16 to 18	72	22.50	30	110	10.05
14	72	23.00	24	72 to 84	10.30
12	72	23.50	20	90	10.10
10	60	24.25	17	72	10.35
7	60	24.50	14	72	10.85
5	60	27.25	12	60	11.75
4	40	30.25	10	60	11.80
3	40	32.00	8	60	12.10
2½	30	33.75			
2	24	52.50			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Cast elliptical, 18 in. or longer, 5000 lb lots	58.92
Electrodeposited	55.25
Brass, 80-20, ball anodes, 2000 lb or more	58.00
Zinc, ball anodes, 2000 lb lots (for elliptical add 2¢ per lb)	20.75
Nickel, 99 pct plus, rolled carbon (rolled depolarized add 3¢ per lb)	90.50
Cadmium	$1.70
Tin, ball anodes and elliptical	$1.06 to $1.10

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	83.50
Copper sulphate, 5 or more 100 lb bags, per cwt	18.15
Nickel salts, single, 4-100 lb bags	33.25
Nickel chloride, freight allowed, 300 lbs	43.50
Sodium cyanide, domestic, fob N. Y. 1 to 4 200 lb drums (Philadelphia add .50 per lb)	21.55
Zinc cyanide, 100 to 900 lb	55.55
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake type, 1 to 20 100 lb drums	31.20

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolt

	Discounts Full case	Full case 20,000 lb. Quantity or more
½ in. & smaller x 6 in. & shorter	61	63
Larger than ½ in. diam. and all diam. longer than 6 in.	55	57
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	61	63
Lag, all diam. x 6 in. & shorter	61	63
Lag, all diam. longer than 6 in.	55	57
Plow bolts	61	63

Nuts, Hex, HP, reg. & hvy.

¾" or smaller	64	66
⅞" to 1⅛" inclusive	63	65
1¼" to 1½" inclusive	65	67
1⅝" and larger	61	63

C.P. Hex regular & hvy.

¾" or smaller	64	66
⅞" and larger	61	63

Hot Galv. Nuts (all types)

1½" or smaller	44	47

Finished, Semi-finished, Hex Nuts

¾" and smaller	66	66
⅞" and larger	63	63

Add 25% for less than case or keg quantity.

Rivets

	Base per 100 lb
½ in. and larger	$9.95
	Pct Off List
7/16 in. and smaller	32

Cap Screws

	Discount Bright	H.C. Heat
New std. hex head, packaged ¼" thru ½" diam. x 6" and shorter	34	20
9/16" and ⅝" x 6" and smaller and shorter	31	16
¾", ⅞", 1" x 6" and shorter	9	+11
New std. hex head, bulk* ¼" thru ½" diam. x 6" and shorter	49	41
9/16" and ⅝" diam. x 6" and shorter	43	39
¾", ⅞", 1" x 6" and shorter	31	20

*Minimum quantity per item:
15,000 pieces ¼", 5/16", ⅜" diam.
5,000 pieces 7/16", ½", 9/16", ⅝" diam.
2,000 pieces ¾", ⅞", 1" diam.

Machine Screws & Stove Bolts

	Discount Mach. Screws	Stove Bolts
Packaged, package list	27	38
Bulk, bulk list		
Quantity		
¼-in. diam. & under — 25,000-200,000	20	61
5/16-in. diam. & larger — 15,000-100,000	20	61
All diam. over 3 in. long — 5,000-100,000	—	61

Machine Screw & Stove Bolt Nuts

	Discount Hex	Square
Packaged, package list	24	27
Bulk, bulk list		
Quantity		
⅜-in. diam. & smaller — 25,000-200,000	18	20

CAST IRON WATER PIPE INDEX

Birmingham	111.3
New York	123.5
Chicago	124.9
San Francisco-L. A.	133.1

Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick	*Carloads per* 1000
First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00)	$122.00
No. 1 Ohio	
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	18.00

Silica Brick	
Mt. Union, Pa., Ensley, Ala.	$128.00
Childs, Hays, Pa.	138.00
Chicago District	138.00
Western Utah	144.00
California	151.00
Super Duty	
Hays, Pa., Athens, Tex., Windham, Warren, O.	145.00
Curtner, Calif.	163.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	21.00
Silica cement, net ton, bulk, Hays, Pa.	24.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala.	22.00
Silica cement, net ton, bulk, Utah and Calif.	32.00

Chrome Brick	*Per net ton*
Standard chemically bonded, Balt.	$91.00
Standards chemically bonded, Curtner, Calif.	101.25
Burned, Balt.	85.00

Magnesite Brick	
Standard Baltimore	$114.00
Chemically bonded, Baltimore	102.00

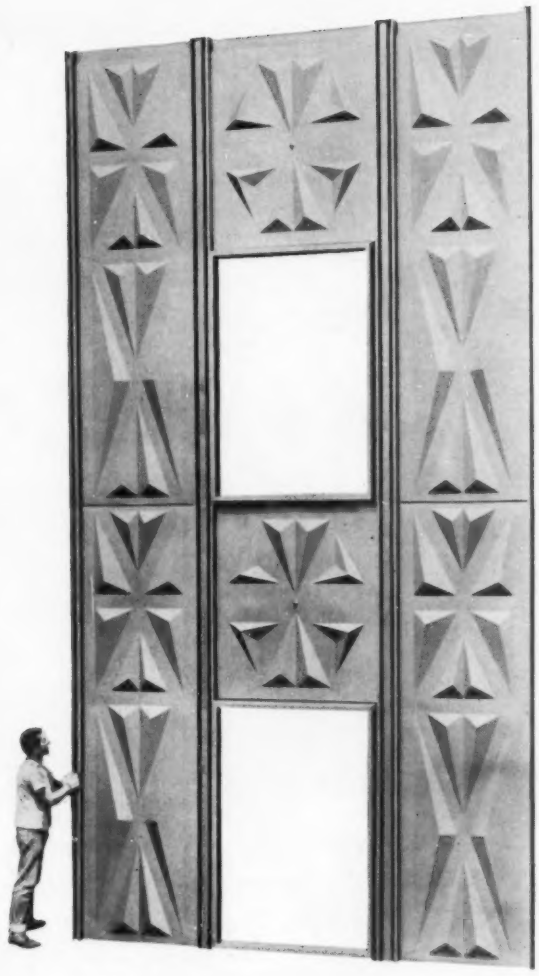
Grain Magnesite	St. ¾-in. grains
Domestic, f.o.b. Baltimore in bulk fines removed	$64.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	40.00
in sacks	46.00

Dead Burned Dolomite	*Per net ton*
F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$15.00
Midwest	15.60
Missouri Valley	14.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	9.50¢
Canadian sponge iron, Del'd in East, carloads	9.5¢
Domestic sponge iron, 98+% Fe, carload lots	9.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.54% pure	22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 00.8+% Fe	86.0¢ to $1.55
Aluminum freight allowed	34.50¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	61.50¢
Copper, reduced	61.50¢
Cadmium, 100-199 lb. 95¢ plus metal value	
Chromium, electrolytic 99.85% min. Fe .03 max. Del'd	$5.00
Lead	7.50¢ plus metal value
Manganese	70.0¢
Molybdenum, 99%	$3.00 to $3.25
Nickel, unannealed	$1.00
Nickel, annealed	$1.06
Nickel, spherical, unannealed, #50	$1.15
Silicon	43.50¢
Solder powder	7.0¢ to 9.0¢ plus met. value
Stainless steel, 302	99.0¢
Stainless steel, 316	$1.32
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$4.50
Zinc, 10 ton lots	18.75¢ to 32.50¢



NOW... ONE-PIECE PANEL STAMPINGS 7' by 15½'

Commercial Shearing fabricates stainless steel, aluminum and porcelain enameling steel

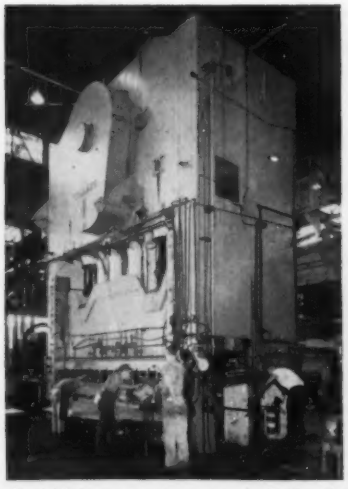
Here is one example of the type of panels and spandrels "Commercial" has fabricated through close cooperation between engineer and architect.

There's a huge 2000 ton press in Youngstown, Ohio, that means new possibilities in curtain wall design. For, now, panels and spandrels up to 7 ft. by 15½ ft. can be walloped out as single stampings . . . and, they roll off the press at a rate as high as 500 sections per day. Fast delivery—plus lower construction costs, because larger sections mean fewer pieces to handle.

Our "know-how" in architectural wall stamping stems from 30 years of experience in producing steel tunnel lining segments and air base landing mats. This knowledge permits you greater latitude in planning for the use of large panels; for once you have conceived the basic design and pattern, our engineers team with you to work out practical fabrication details and methods.

Whether you need large panels for the skin of a metal-clad building or for some other application, we can contribute to the teamwork necessary to produce a well-designed product, yet one that can be economically fabricated.

For further information, write today to Dept. K-14, The Commercial Shearing and Stamping Co., Youngstown, Ohio.



● 2000 ton press over 4 stories in height forms any size ornamental panel in varying dimensions up to 7′ by 15½′ from any suitable metal.

● 7000 stainless steel panels were fabricated at Commercial Shearing and Stamping for the exterior skin of the new Socony-Mobil Building.

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shearing and stamping

Ferroalloy Prices

(Effective April 3, 1956)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk carloads, del'd, 67-71% Cr, .30-1.00% max. Si.

0.02% C ...	38.50	0.20% C ...	35.50
0.03% C ...	38.00	0.50% C ...	35.25
0.06% C ...	36.50	1.00% C ...	34.00
0.10% C ...	36.00	1.50% C ...	33.85
0.15% C ...	35.75	2.00% C ...	33.75

4.00-4.50 C, 67.70% Cr, 1-2% Si ... 26.25
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si ... 25.00
0.025% C (Simplex) ... 31.75

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.27
0.50% max. C	1.27
9 to 11% C, 88-91% Cr, 0.75% Fe	1.36

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (⅛" thick) delivered packed. 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	1.25
Ton lots	1.27
Less ton lots	1.29

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.

Carloads	41.85
Ton lots	46.15
Less ton lots	48.65

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed. 30-33% Ca, 60-65% Si, 3.00 max. Fe.

Carloads	22.95
Ton lots	25.25
Less ton lots	26.75

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed. 16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	23.05
Ton lots	24.95
Less ton lots	25.95

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	19.65
Less ton lots	20.90

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	10.75
Johnstown, Pa.	10.25
Sheridan, Pa.	10.25
Philo, Ohio	10.25
S. Duquesne	10.75

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:	
Carloads, bulk	13.00
Ton lots packed	15.20

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$92.00
19 to 21%	3% max.	94.00
21 to 23%	3% max.	96.50

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	33.00
Ton lots	35.00
250 to 1999 lb	37.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn. ... 22.85

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	34.00	35.55	36.75
0.07% max. C	31.95	33.50	34.70
0.10% max. C	30.20	32.75	33.95
0.15% max. C	29.45	32.00	33.20
0.30% max. C	27.95	30.50	31.70
0.50% max. C	27.45	30.00	31.20
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	24.45	27.00	28.20

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carload bulk	12.00
Ton lots	13.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet	13.55
Ton lots, packed	15.75

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $98.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96.50% Si, 2% Fe	22.75	21.45
98% Si, 1% Fe	23.25	21.95

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	7.15
Ton lots, packed	9.75

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si ...	12.75	75% Si ...	15.40
65% Si ...	14.50	85% Si ...	17.10
	90% Si ...	18.50	

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.

Openhearth	3.10
Crucible	3.20
High speed steel (Primos)	3.30

Alsifer, 20% Al, 40% Si, 40% Fe.

Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6%

f.o.b. Langeloth, Pa., per pound contained Mo ... $1.34

Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Sb plus Ta ... $4.65

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo ... $1.54

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton ... $90.00
10 tons to less carload ... $110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.35

Ferrotitanium 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.50
Less ton lots ... $1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton ... $177.00

Ferrotungsten, ¼ x down, packed, per pound contained W, ton lots, delivered ... $3.45

Molybdic oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa. ... $1.32
bags, f.o.b. Washington, Pa., Langeloth, Pa. ... $1.30

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	17.50¢
Ton lots, packed lump	19.50¢
Less ton lots	20.00¢

Vanadium oxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5 ... $1.33

Zirconium contract basis, per lb of alloy

35-40%, f.o.b. freight allowed, carloads, packed	26.25¢
12-15%, del'd, lump, bulk-carloads	8.50¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed. B 3.14%, Si 40-45%, per lb contained 2 ... $5.25

Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed

Ton lots per pound ... 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots ... 1.20
F.o.b. Wash., Pa.; Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 3 in. x D, del'd.

D, del'd.	
Ton lots	$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots ... $2.05

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Steel made in ALCO's own open hearth furnaces is your guarantee of the exact metallurgy for your flange requirements. You benefit because ALCO controls deoxidation, grain size and creep properties, meets individual tensile requirements, provides proper grain flow. You save because your welding procedures can be standardized and because exact steel chemistries for the most economical preheat and postheat procedures are provided.

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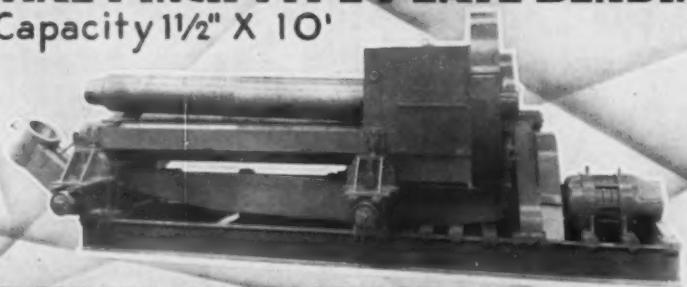

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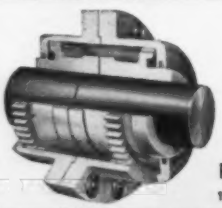

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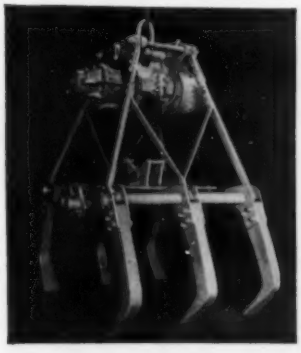

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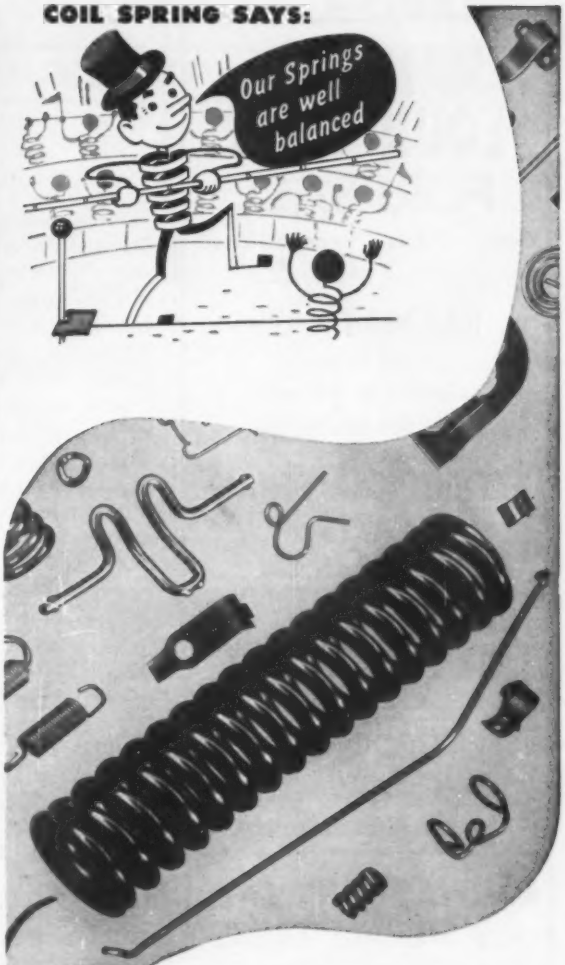

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THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Pittsburgh Market Firm . . . Demand for cranes, machine tools and rolling mills continues good in Pittsburgh. Big dealer difficulties seem to be getting enough late-model equipment, and satisfying special needs of customers.

Area companies get a good amount of service out of a machine before they turn it loose. Dealers must do a lot of shopping in Detroit, Cleveland and other machinery centers. If a machine is being added to stock, considerable cash is tied up in transportation and hauling.

On heavier plate working equipment and on forging equipment, the situation is less critical. Age is less of a factor, but standard machine tools must be under 15 years old to attract buyers. Good tools are scarce. There are plenty of buyers for brakes, shears and bending rolls, but the model must be right.

Adding to his troubles, according to one dealer, is the growing number of machines being moved through auctions. Participation of users in auctions and the exciting effect of bidding sessions tend to send prices out of the reach of the ordinary dealer, he said. He cited examples of users paying more for auction equipment than the price of a similar, guaranteed machine from a dealer.

Can't Sell In Volume . . . In addition most sales are made strictly on an individual basis with no volume of duplicate models to be profitably sold after interest has been generated.

"I had a 10 in. plate shear," said a dealer. "I stirred up interest in it. Now I have 10 inquiries but I've already sold the unit."

In the crane line, the situation is similar. It is now a little harder to do business than in the good first quarter. But inquiries are holding up well. Difficulty lies in matching requirements with the available supply.

Special Requirements . . . One rebuilder, commenting on the special requirements of buyers, said he doubles his costs to arrive at a price that will take care of the many extras. While this may be a slight exaggeration, it is true that crane men must do an unusual amount of special figuring on any job.

Biggest crane demand is for AC models with a 60-in. span and 10-ton capacity. The trend is toward wider span, with the 75-ft size moving well. Electrical requirements are a running headache in crane sales. Larger companies will have their own generators and can take DC units. But the smaller plants, who are the big buyers of used and rebuilt cranes, must stick fairly close to standard AC currents.

Better Guess Right . . . Special design and special accommodations make the crane market unpredictable. One dealer told of buying a model he was sure would move quickly. It did not. He wound up having to haul the crane to his home area and warehouse it. Eventually, he found a buyer. The model was sold to a plant close to the original site, with handling adding about $1200 to the price.

Market Rolling Along . . . The market for rolling mills looks strong. Bar mills are moving very well. Problem, again, is one of supply. One dealer said he had enough equipment lined up for the next six weeks. After that, he didn't know. But he regarded this as the standard situation.

"Before, we had plenty to sell and no interest," he said. "Now, we're swamped with inquiries and can't get equipment."

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9' x ⅜" Hilles & Jones Pyramid Type
14' x 3/16" Hilles & Jones Pyramid Type
12' x ⅜" Cleveland Pyramid Type
16' x ⅜" Niles Pyramid Type
20' x ⅜" Bertsch Pyramid Type
24' x ½" Hilles & Jones Pyramid Type
27' x 1" Southwark Pyramid Type

BRAKES—LEAF TYPE
12' x ⅜" Dreis & Krump
12' x ½" Dreis & Krump, Motor Driven

BRAKES—PRESS TYPE
12' x 3/16" Cincinnati
14' x ¼" Cincinnati Series 120-14

BULLDOZERS
#5 Williams & White, 20" Stroke, 11½" x 63" Face of Crosshead
#27 Williams & White, 22" Stroke, 16" x 80" Face of Crosshead

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H	29' Span 230 Volt D.C.
5 ton P&H	30' Span 220/3/60 A.C.
5 ton Cleveland	90' Span 230 Volt D.C.
7½ ton P&H	65' Span 440/3/60 A.C.
7½ ton Bedford	70' Span 440/3/60 A.C.
10 ton Milwaukee	80' Span 230 Volt D.C.
10 ton P&H	90' Span 220 Volt D.C.
20 ton Toledo	75' Span 550/3/60 A.C.
120 ton Whiting	80' Span 220/3/60 A.C.

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Type BG-3 10' x 14'6" Pratt & Whitney Keller Automatic Duplicator

FORGING MACHINE
1" to 7" Acme, Ajax, National

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Hevi-Duty Electric Furnace, Hot Zone 18" high, 36" Wide Opening. 10'9" Deep I.D.
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2000 lb. Chambersburg Ceco-Drop

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18" United, 13 Rolls 1½" Dia.
52" McKay, 17 Rolls 3⅝" Dia.
90" Budd-McKay Sheet Processor & Leveler, Leveling Rolls 3⅜" dia.

PLANERS—PLATE EDGE
30' x 1¼" Southwark, 16 Pneumatic Jacks
35' x 1½" Southwark, 16 Pneumatic Jacks

PRESS—GAP FRAME
125 ton Beatty Inclined Open Back Gap Press. Stroke 1½". Bed Area 28⅝" x 26⅝" (New)

PRESSES—HYDRAULIC
530 ton Baldwin Southwark 12" Stroke 48" x 25" Between Columns
800 ton Clearing 48" Stroke, Bed Area 48" x 48"
1000 ton Lake Erie Double Acting 46" Stroke. Bed Area 72" x 146"
1257 ton Baldwin Southwark Forging Press, 30" Stroke Main Ram, 54" x 41" Bet. Columns
4500 ton B-L-H Hydr. Forging Press
600-84 Cleveland Double Crank, 14" Stroke, Bed Area 46" x 84"

PRESSES—STRAIGHT SIDE
#8½ 4P Zeh & Hahnemann Percussion Press 75 ton Clearing Model TF41500-200 Triple Acting, Strokes 40, 32, 14", Bed Area 100" x 200"

PRESS—TOGGLE
DF2450-118 Clearing 4-Point Mech. Dbl. Acting, Stroke of Plunger 37", Blankholder 26", Bed Area 66" x 126"

PUNCH & SHEAR COMBINATIONS
Style EF Cleveland 36" Throat, Punch 1¼" thru 1" Style W Cleveland 60" Throat, 312 Ton

ROLLS—PLATE STRAIGHTENING
60" McKay, 7 Rolls 10" Dia.
72" Bertsch Seven 7" Dia. Rolls

ROLLING MILLS
12" x 16" Phila., Single Stand, Two High
15" x 28" Farrel Single Stand, Two High
15" x 30" G & M Single Stand, Two High
16" x 21" Farrel Single Stand, Two High
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12" Three High Bar Mill
26" x 54" United Four Stand, Two High

ROLLS—FORMING
8 Stand Rafter Tube Forming Machine, Spindle 1⅞"
5 Stand Bliss Roll Forming Machine, Shaft 2⅞"

SHEAR—BILLET
No. 7 Hilles & Jones, Motor Drive. Cap. 5" Sq.

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86" x 1" Hilles & Jones

SHEAR—ANGLE
6 x 6 x ⅝" Cleveland

SHEARS—SQUARING
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12' x ⅜" Steelweld

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Qu.	H.P.	Make	Type	Volts	Speed
1	1500	G.E.	MT	6900	1187
1	1100	G.E.	IM	2300	720
1	1000	A.C.	Mill	2300	240
1	800	G.E.	MT	2300	293
1	750	G.E.	MT-573	2200	1190
1	700	A.C.		2300	500
1	500	Whse.	CW	550	350
1	400	Whse.	CW-960A	440	1170
1	400	Whse.	CW	440	514
1	400	Whse.	CW-1213	2200	435
1	350	G.E.	IM-17A	440/2200	720
1	250	G.E.	MT-424Y	4000	257
1	250	G.E.	MT-559S	2200	1800
1	250	Al. Ch.		550	600
1	200	Cr. Wh.	29QB	440	505
1	200	G.E.	IM	440	435
1	200	G.E.	IM	2200	580
1	150(unused)	Whse.	CW	2300	435
2	125	A.C.		440	865
1	125	Al. Ch.		440	720
1	100	G.E.	IM-16	2200	435
1	100	G.E.	IM	440	600
4	100	A.C.	ANY	440	695
		SQUIRREL CAGE			
1	800	G.E.	KT-573	2200	1180
2	650	G.E.	FT-559BY	440	3570
3	450	Whse.	CS-1420	2300/4150	354
1	400	G.E.	IE-15B	2200	1165
1	400	G.E.	IK	2200	500
1	200	G.E.	IK-17	440	580
2	200	G.E.	KT-557	440	1800
1	150/75	G.E.	IK	440/900/450	
1	150	Whse.	CS-856S	440	880
1	150	Whse.	CS	440	580
2	125	Al. Ch.	ABW	2200	1750
1	100	Whse.	CS-876C-TEFC	440	710
		SYNCHRONOUS			
2	2000	Whse.		2300	120
2	1750	G.E.	ATI	2300	3600
1	735	G.E.	ATI	2200/12000	600
1	500	Ideal	SM	2300/4160	1800
2	500	G.E.	TS-7567	2200	1200
1	450	Whse.		2200	128.5
1	450	Whse.		2200	450
1	400	G.E.	TS-7565	2200	1200
1	400	G.E.	TS	2200	400
1	4350	C.W.	3501SL	4000/6900/13800	514
1	325	G.E.	ATI	440	1800
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20" x 67" Axelson H. D. engine lathe, late.
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14" x 6' Hendey Toolroom, 1940.
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M-24 Kearney & Trecker Mfg. Mill.
1-18 Cincinnati production.
2-18 Cincinnati production, late model.
Model 2-29 Kent-Owens hyd. mill, late (2).
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545 ton No. H3612½ Hamilton Forging Press.

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1	500	Cr. Wh.	720	600	2300/440
2	500	Whse.	1200	125/250	2300/440
1	400	Cr. Wh.	1200	125/250	2300/440
1	300	G.E.	1200	250	2300
1	200	G.E.	1200	250	2300
1	150	G.E.	1200	250	2300
1	100	Whse.	900	250	2300

LARGE MILL MOTORS

Qu.	H.P.	Make	R.P.M.	Volts	Type
2	3000	Whse.	600	525	tandem
6	1500	Whse.	600	525	Encl.
1	1250	G.E.	350/790	600	MCF-6
4	800	Whse.	600	525	Encl.
4	700	Whse.	300/700	250	Encl.
2	600	Al. Ch.	300/600	600	Mill
1	250	Al. Ch.	250/1000	250/375	Mill

SLIP RING MOTORS
Constant Duty, 3 Phase, 60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1500	G.E.	MT-498	2300	380
2	1000	G.E.	M-575-S	2300	1185
1	750	G.E.	I-M	2200	400
1	500	Al. Ch.	ANY	2200	505
1	500	G.E.	I-M	2300	450
1	450	G.E.	I-14-M	2300	595
1	450	Whse.	CW	2200	440
1	400	Al. Ch.	ANY	2200	505
1	400	G.E.	MT-424	2300/440	352
1	300	Whse.	CW-1012	2200	704
1	250	Al. Ch.	ANY	440	705
1	250	Whse.	CW-1106	2200	435
1	250	G.E.	MT-414	2200	300
2	200	Al. Ch.	ANY	2200	585
1	200	G.E.	I-14-M	2200	490
1	150	Al. Ch.	ANY	440/220	705
1	150	Whse.	CW	440/220	490
1	150	Whse.	CW-1000	440/220	435
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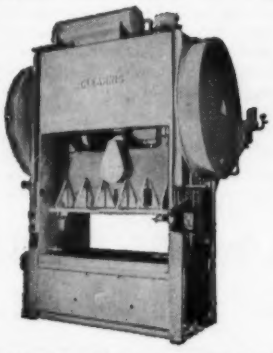

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36" x 18' bed Putnam Geared Head, m.d.
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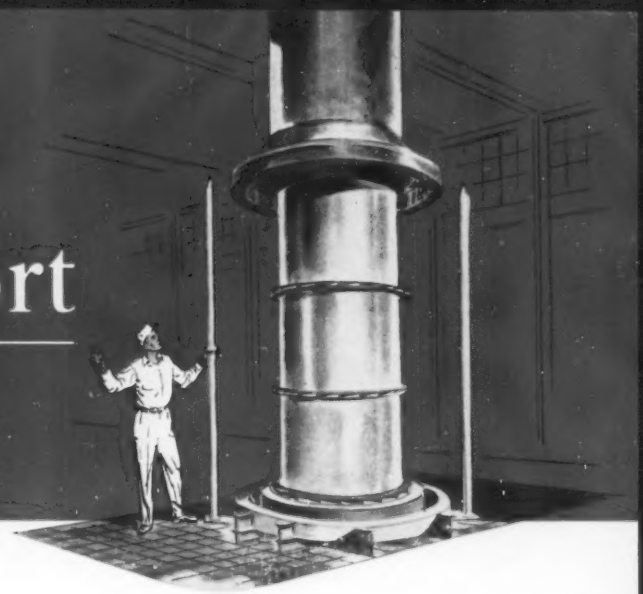

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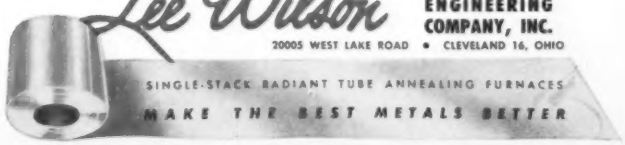
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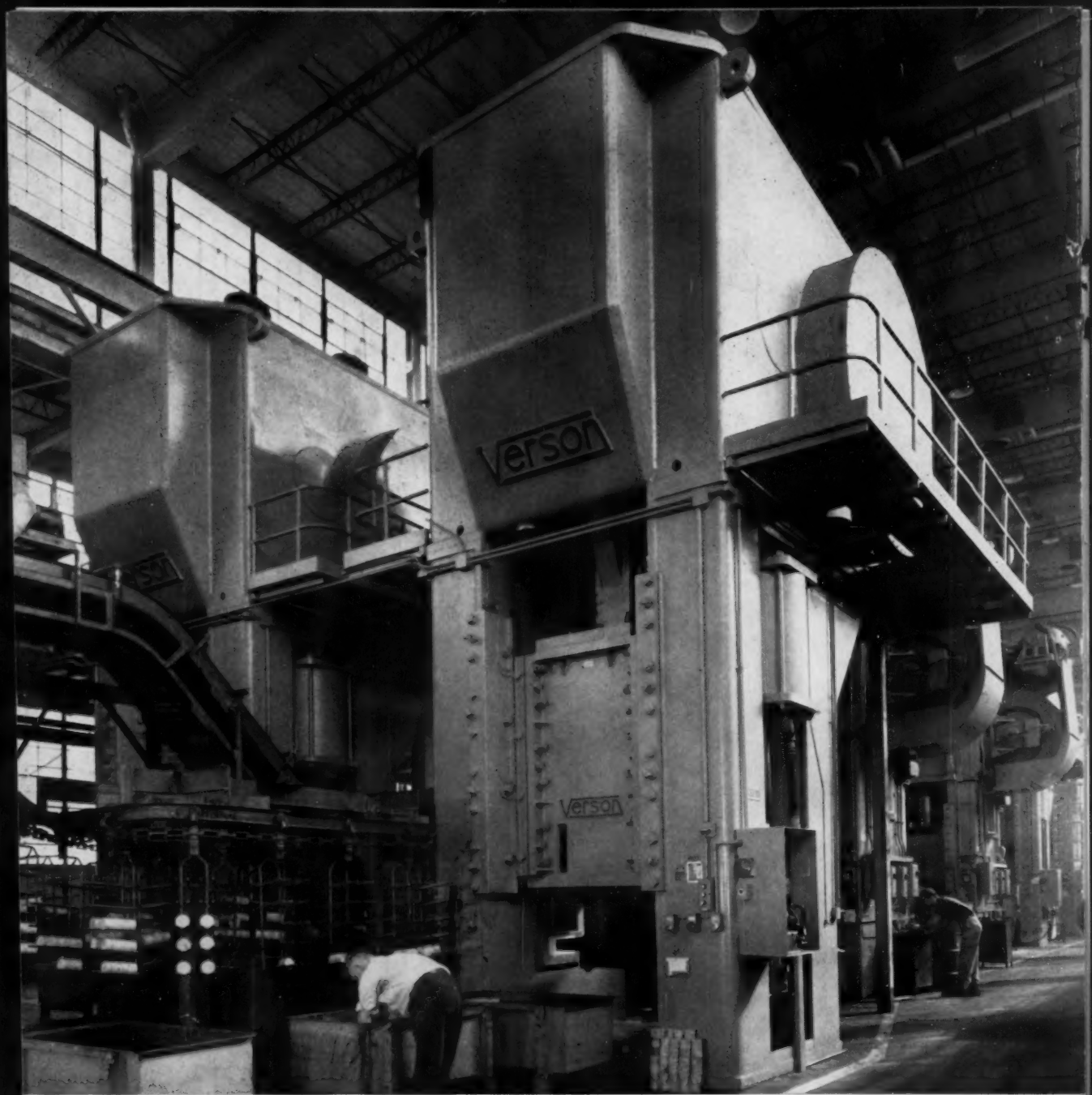

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